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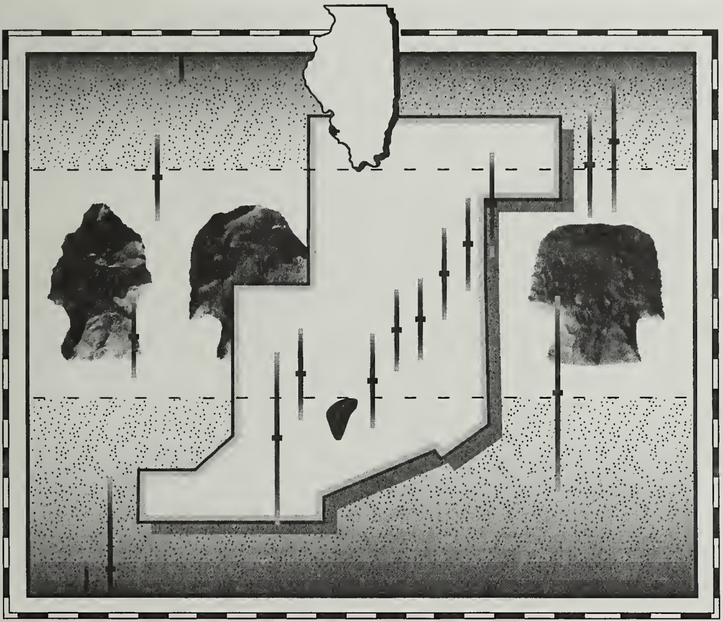
ARCHAEOLOGICAL INVESTIGATIONS FOR THE RELOCATION OF VALMEYER, MONROE COUNTY, ILLINOIS

VOLUME 2: THE STRONG SITE



by Brian Adams, Gregory R. Walz, Paul P. Kreisa, Kevin P. McGowan,
Jacqueline M. McDowell, and Cynthia L. Balek

PUBLIC SERVICE ARCHAEOLOGY PROGRAM

RESEARCH REPORT No.28

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VOLUME 2: THE STRONG SITE

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Public Service Archaeology Program Research Report No. 28

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ABSTRACT

Phase II investigations by the Public Service Archaeology Program of the University of Illinois at Urbana-Champaign for the Federal Emergency Management Agency indicated that 11MO841, the Strong site, was eligible for listing in the National Register of Historic Places. Total data recovery was conducted by the Public Service Archaeology Program in advance of construction for the relocation of the community of Valmeyer, Illinois, from 12 July through 30 July 1994. The project was funded by the Federal Emergency Management Agency through a subcontract agreement with Woodward-Clyde Federal Services of Gaithersburg, Maryland. The plow zone was mechanically removed from 22,000 m^2 and exposed 66 prehistoric pit features. Six radiocarbon age determinations on charred nutshell and wood indicate occupation of the site between 6900 and 6500 B.P. The artifact assemblage from the site includes lithic remains indicative mainly of early-stage reduction activities and use of expedient tools. The botanical remains indicate an emphasis on the harvesting and processing of hickory nuts.

The site is interpreted as a Middle Archaic residential extractive camp. Data are presented to define a new projectile point type, Valmeyer Corner Notched, and a new Middle Archaic phase for the southern American Bottom. The Dennis Hollow phase is defined on the basis of radiocarbon age determinations and the Valmeyer Corner Notched projectile point. The phase precedes the previously defined Nochta phase for the American Bottom.

CHAPTER 1.
INTRODUCTION

The Strong site (11MO841) is located north of Dennis Hollow where the Mississippi River valley bluff slope meets the uplands approximately 2.3 km east of Valmeyer, Illinois (Figure 1-1). The site is situated on a relatively narrow upland ridge between two steep drainages that flow into the Mississippi River bottoms to the north and east, respectively. East of the site, the upland ridges are broader and flatter. Agriculture has removed the native vegetation from the site, but the steep, sloped areas adjacent to it are brush and tree covered. It is likely the entire site was covered with oak and hickory forest prehistorically.

Previous Investigations

The site originally was defined in 1989 by the American Resources Group. They recorded 11MO841 as an 80-x-80-m lithic scatter, interpreted as a lithic workshop (Figure 1-2). No diagnostic artifacts were located, and the site was recommended as ineligible for the NRHP (McNerney 1989). The Phase I investigation by Southern Illinois University at Edwardsville conducted for the Valmeyer relocation project reevaluated the site. It was recommended that the site limits be expanded to include almost 179 ha (Figure 1-2). Wells and Burns (1993) further suggested that portions of the expanded site were potentially eligible for the NRHP. The Public Service Archaeology Program of the University of Illinois at Urbana-Champaign collected additional data during the Phase II NRHP evaluation of 11MO841, further refining the site dimensions. The Phase II investigations resulted in the separation of 11MO841 into 13 discrete sites, with the original area defined by McNerney (1989) retaining the 11MO841 designation. As characterized during the Phase II investigations (Volume 1), 11MO841 is roughly triangular in shape extending 300 m southwest-northeast and 125 m northwest-southeast for a total site area of approximately 3.75 ha.

Surface materials at the Strong site extended from a ridge crest down slope, with material concentrations identified on a gentle south-facing slope in a cleared agricultural field (Figure 1-3). Phase II excavation of 1,176 m^2 of surface area, roughly 3 percent of the site total, resulted in the documentation of in situ Middle to Late Archaic features. The presence of intact cultural deposits at this Archaic upland site demonstrated significant research potential. The site was recommended as eligible for listing in the National Register of Historic Places (McGowan 1994 and Volume 1, this report).

Excavation Strategy

The presence of the Strong site within an area that was scheduled to be impacted by the relocation of Valmeyer resulted in the implementation of a mitigation plan to salvage the archaeological data. Excavation of the Strong site occurred between 12 and 30 July 1994. The excavation strategy implemented, large-scale machine excavations, is one that has seen success at numerous prehistoric sites in the nearby American Bottom. Large-scale stripping of plow zone deposits and subsequent feature identification has been shown to provide spatial data not commonly obtained through other methods (Bareis and Porter 1984; Binford et al. 1970). As well, it provides a cost effective and timely method for mitigation of large sites faced with destruction (e.g., Bareis and Porter 1984; Binford et al. 1970).

The plow zone and up to 20 cm of underlying subsoil was removed from approximately 22,000 m^2 of the site. The removal of the disturbed plow zone deposits allowed identification of dark subsurface stains and artifact concentrations. All stains and artifacts from below the plow zone were evaluated to determine whether they were cultural features. Each stain or artifact concentration was assigned a unique number and excavated. Excavations used a combination of troweling and shovel skimming. The

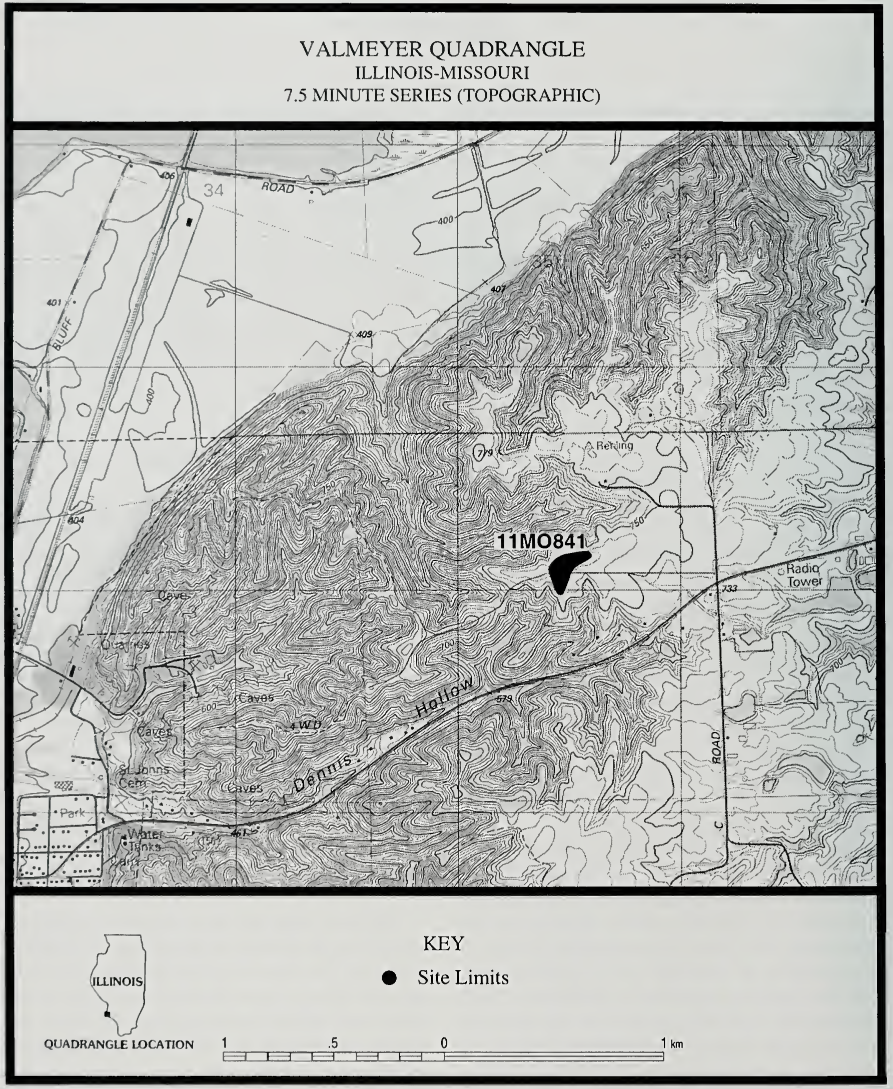

Figure 1-1. The Location of the Strong Site, 11MO841.

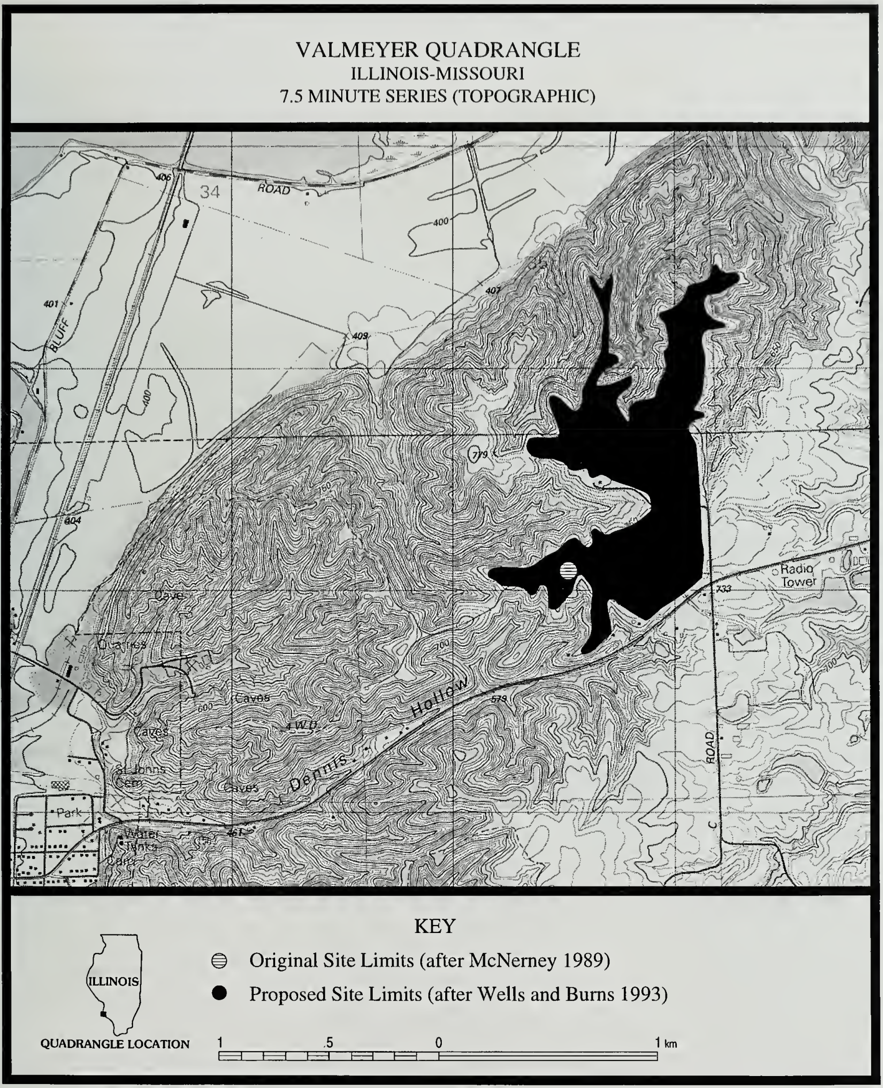

Figure 1-2. Previously Proposed Site Limits for 11MO841.

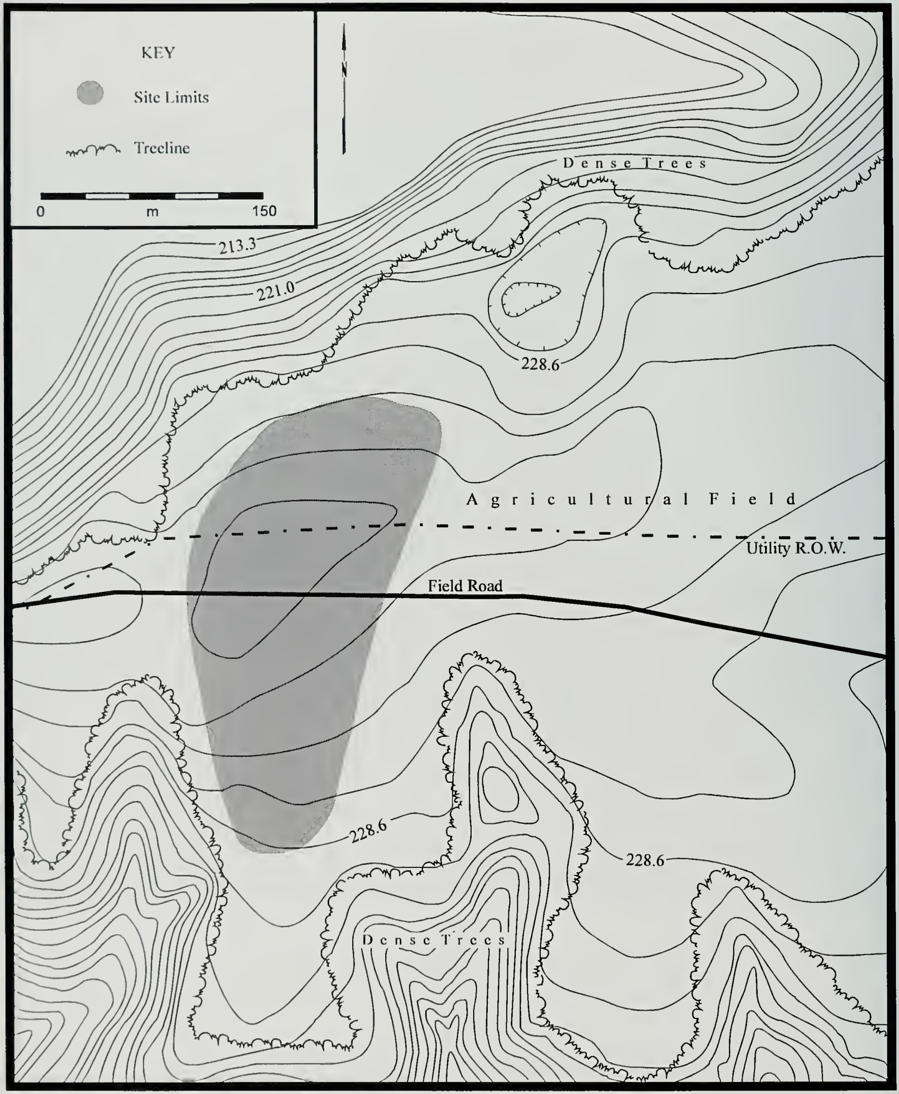

Figure 1-3. Topographic Map of 11MO841.

features were photographed, and a plan view sketch map was drawn. Upon completion of this initial documentation, each feature was bisected along a major axis and all fill screened. A feature profile was drawn and photographed after the first half was excavated. The second half then was excavated. All fill was screened, and a flotation soil sample was collected as were charcoal samples when possible.

The investigations documented and analyzed a total of 66 prehistoric pit features. Radiometric dates of carbonized nutshell and wood collected from six features provide conventional ^{14}C dates ranging from 6870–6560 B.P., placing occupation during the Middle Archaic period. The assemblage is dominated by lithic debitage, but includes a point type that falls between well-defined Early Archaic and Late Archaic types. The materials and ^{14}C dates partially characterize a new Middle Archaic phase, the Dennis Hollow phase, in the American Bottom region. The consistent size and fill of the documented features indicate a limited range of activities at this site and possibly a single occupation.

Overview

This volume details the archaeological investigations undertaken at the Strong site by the University of Illinois at Urbana-Champaign. The reader is referred to Volume 1 of this report for an expanded discussion of the contextual background materials for this project. A review of Middle Archaic investigations in the American Bottom and surrounding regions is provided in Chapter 2. Chapter 3 presents the general research orientation employed for the Strong site. Excavation results are presented in Chapter 4 with an emphasis on site plan and features. Detailed material analyses are provided in Chapters 5 (lithics), 6 (paleoethnobotanical), 7 (faunal), and 8 (clay). Chapter 9 discusses the results of the investigation and proposes the Dennis Hollow phase as a new local Middle Archaic phase. Detailed feature descriptions and material inventories for the Strong site are provided as appendices to this volume.

CHAPTER 2.
THE MIDDLE ARCHAIC IN SOUTHWEST ILLINOIS

The Middle Archaic period in southwest Illinois refers to the period of time that extends from 8000 to 5000 B.P. Known intact sites from this time period are few, and excavation data are restricted to only a few sites. As a result, very few Middle Archaic phases have been defined for the American Bottom region, and the nature of Middle Archaic lifeways remains poorly understood in much of the midcontinent. The Middle Archaic represents an important period of cultural adaptation and transition between the preceding Early Archaic period, characterized by highly mobile hunting and gathering adaptations, and the succeeding Late Archaic period during which increasingly sedentary lifeways become apparent at a number of localities throughout the Midwest. This time span is associated with the onset of modern climatic conditions and establishment of vegetation patterns documented by Historic Era settlers. These modern conditions folowed the mid-Holocene Hypsithermal Interval, a period of climatic warming and drying. Vegetational changes that occurred during the 3,000-year span of the Middle Archaic period include an expansion of the prairie/forest vegetational ecotone eastward into Illinois between 8000 and 6000 B.P. (in part as a result of the Hypsithermal) and the subsequent expansion of forest cover after 4000 B.P. (Asch et al. 1972; Bettis and Hajic 1995; Holloway and Bryant 1985; Zawacki and Hausfater 1969). Middle Archaic sites in general are larger and more intensively occupied than Early Archaic sites, and site locational data indicate a shift to river valleys from upland settings, possibly a response to the drier conditions of the Hypsithermal Interval (Emerson et al. 1986). Middle Archaic sites also reveal an increased reliance on a narrower spectrum of locally available resources and diversification in tool types. Diagnostic Middle Archaic projectile point styles include side-notched, stemmed, and corner-notched forms, although the side-notched varieties predominate. Named Middle Archaic side-notched projectile points include types such as Big Sandy, Brannon, Faulkner, Godar, and Matanzas.

To understand the significance of the Strong site findings more fully and to place its interpretation into the proper context require an understanding of regional Middle Archaic research. Geographically, the most germane investigations have been conducted in the American Bottom, Southern Illinois, and the lower Illinois River valley. Based on a handful of sites from the Midwest and general trends noted throughout the Eastern Woodlands, a Middle Archaic context to evaluate the Strong site can be constructed from the available data.

Interpretations of the Middle Archaic period for the American Bottom region rely extensively on the investigations of Modoc Rock Shelter (11R5) (Ahler 1993; Fowler 1959; Styles et al. 1983) and the Nochta site (11MS128) (Higgins 1990) (Figure 2-1). Both Modoc and Nochta are located in the Mississippi River valley but are situated in different environmental and physiographic settings. Modoc Rock Shelter is located at the base of the Mississippi River bluffs some 29 km south of Valmeyer near the narrow, southern end of the American Bottom. The Nochta site is located on a sand ridge between two Mississippi River meander scars in the widest expanse of the American Bottom, approximately 56 km north of Valmeyer. Both of these sites provide distinct, but complimentary, insights into Middle Archaic cultural adaptations in the region.

Modoc Rock Shelter is a multicomponent, stratified site with occupation beginning late in the Paleoindian period and continuing through the Holocene. Radiocarbon dates from the Middle Archaic strata range between 8000 and 5000 B.P. (Ahler 1993). Features defined at the site include pits, post molds, and hearths. The lithic assemblage from the Middle Archaic strata indicates a broad variety of formal tools and a high incidence of bifacial thinning flakes, suggesting tool maintenance and curation. The floral assemblage is notable for the high incidence of hickory, presence of pecan, and low frequency of seeds. The faunal assemblage

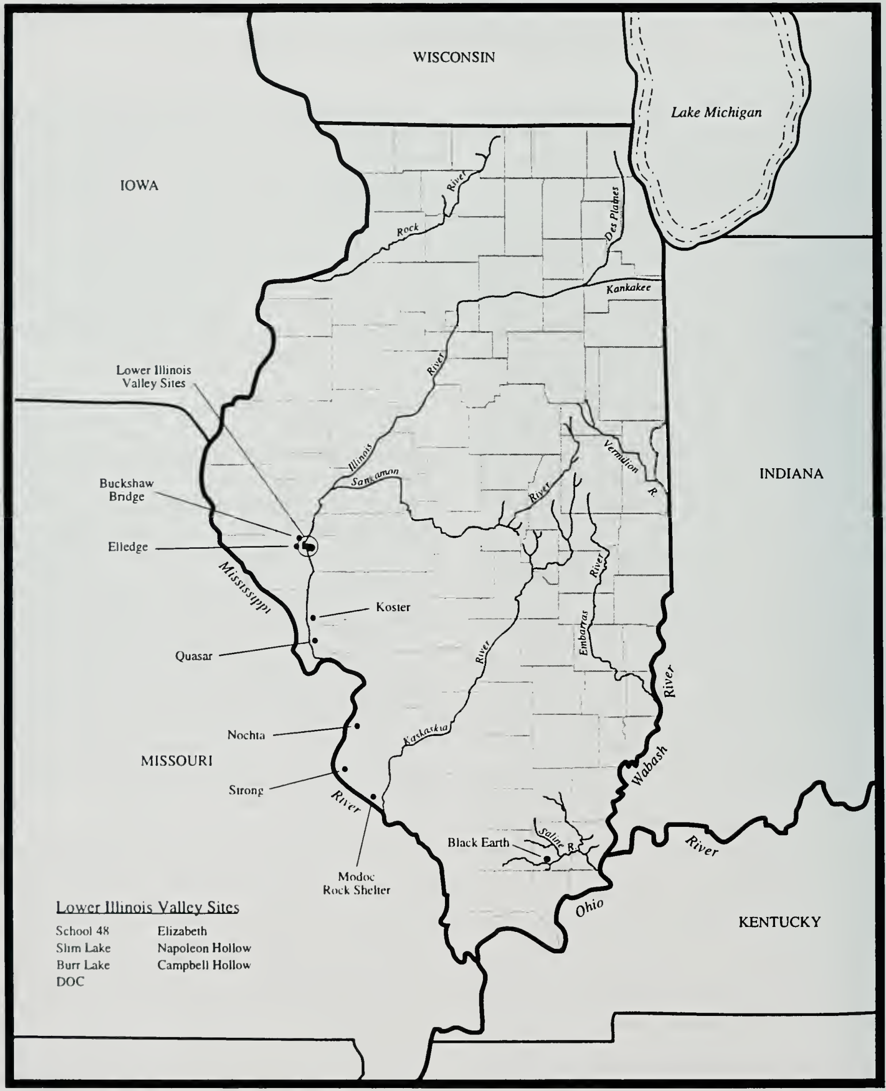

Figure 2-1. Locations of Middle Archaic Sites Mentioned in Text.

demonstrates a relatively higher utilization of small mammals over large mammals, and a strong emphasis on aquatic species including fish, crayfish, and mussels. The data from Modoc indicate deer did not become a major food staple until the Late Archaic. The Middle Archaic component at Modoc is interpreted as a series of base camp settlements that were occupied for longer segments of time than previously. The Middle Archaic occupation of Modoc as a base camp may indicate a preference to locate such settlements in physiographic settings with ready access to a variety of distinct habitats (e.g., aquatic and riparian floodplain zones, valley margin oak/hickory forests, and upland forest/prairie ecotones) where targeted resources could be obtained (Ahler 1993; Fowler 1959; Styles et al. 1983).

Nochta is a multicomponent site located on a sandy American Bottom floodplain ridge with Dalton, Early Archaic, Middle Archaic, and Middle Woodland occupations. Radiocarbon dates obtained on charcoal recovered from feature contexts range between 6890 and 6180 B.P. The Middle Archaic component was recognized in 220 features, including single and multizone basin-shaped pits, single and multizone flat bottom pits with either outslanting or parallel sides, a bell-shaped pit, rock clusters, and a large rectangular basin. The most common (60 percent) feature is a single zone basin-shaped pit. The large rectangular feature is interpreted as a residential structure. The lithic assemblage from the Middle Archaic component includes small side-notched projectile points classified as Robinson. The assemblage is noted for the lack of bifacial tools other than projectile points, extensive expedient flake tools, initial-stage reduction debitage, *pièces ésquillées*, and cobble tools. The conservative nature of the chert assemblage is interpreted to be the result of short-term occupations at the site. The botanical assemblage is dominated by hickory nut shell; acorn and walnut are present in minor amounts. The nutshell assemblage indicates that both floodplain taxa such as walnut and upland or bluff slope taxa such as hickories were collected. The Middle Archaic occupation of Nochta represents a repeatedly occupied field camp for a logistically organized group of collectors (Higgins 1990). Based on the excavations at Nochta, Higgins (1990:114) defines the Nochta phase as extending from ca. 6500 to 6100 B.P. Diagnostics associated with this phase include small side-notched projectile points, principally Robinson and Brannon, with Matanzas, Godar, and Apple Blossom Stemmed points comprising a portion of the assemblage. The Nochta phase is viewed as an American Bottom equivalent to the early portion of the Helton phase identified in the lower Illinois River valley.

Outside the American Bottom region, significant investigations of Middle Archaic sites have been conducted at Black Earth (11SA87), Koster, and Napoleon Hollow (Figure 2-1). The Koster site is located 119 km north of Valmeyer on a terrace along Koster Creek at the eastern edge of the Illinois River Valley (Brown and Vierra 1983). The Black Earth site is located in the Saline River valley approximately 154 km east-southeast of Valmeyer. This site is located along the crest of a low ridge immediately north of the South Fork of the Saline River (Jefferies and Butler 1982). The Napoleon Hollow site is located 159 km north of Valmeyer at the bluff base of a small tributary valley on the western margin of the Illinois River Valley (Wiant et al. 1983). All three of these sites have complex occupational and depositional histories and are located in floodplain valley settings. These three sites provide the greatest detail available for understanding Middle Archaic occupations in Illinois.

Koster is a deeply stratified site that has Early Archaic period through Historic occupations. Three phases have been defined for the Middle Archaic period of the lower Illinois River valley based on components present at Koster and other excavated sites in the area. The Middle Archaic 1 phase is dated from 8300 to 7600 B.P. and represents the earliest Middle Archaic occupation of the site. This phase is defined on radiocarbon dates obtained from hearth features and the presence of corner-notched projectile points. The Middle Archaic 2 phase is dated between 7300 and 6850 B.P. This phase is defined by artifacts including Jakie Stemmed, Stone Square Stemmed, Table Rock Stemmed (Apple Blossom), Godar, and Matanzas projectile points; ground-stone tools such as manos, pestles, and full-grooved axes; and a diverse array of bone and antler tools. Features dating to this phase include hearths, a house platform with deep post pits, and a human burial which, when taken together, indicate an increased level of sedentism over earlier Middle Archaic occupations at the site. The Middle Archaic 3 phase, also called the Helton phase, is dated between 5800 and 4900 B.P. This phase is defined by artifacts which include Matanzas, Godar, Helton, Karnak Stemmed, and Table Rock projectile points, and three-quarter grooved and fully grooved axes. Large functionally diverse pits, pit ovens, linear trench ovens, hearths, and house platforms have been associated with this phase. Trends identified at Koster between the three Middle Archaic phases include more intensive long-term occupations, a subtle shift from expedient tool manufacture to optimal use of nearby lithic resources, a shift from generalized faunal exploitation to the targeted use of aquatic backwater species, and increased use of hickory nuts in the diet. These changes are viewed as a result of a subsistence-settlement shift from one based on a highly mobile pattern of residential mobility to one increasingly oriented toward more sedentary occupations in strategic locations and based on logistical mobility (Brown 1985; Brown and Vierra 1983).

The Black Earth site is one of a cluster of sites that comprise the Carrier Mills Archaeological District (Jefferies and Butler 1982). Excavations in Zone 3 of Area A identified 189 Middle Archaic features including shallow basin-shaped pits, charcoal concentrations, deep cylindrical pits, and clay concentrations. The most common feature is the shallow, oval, basin-shaped pit (43 percent). Radiocarbon dates obtained from Area A range between 5905 and 4860 B.P. The radiocarbon determinations and the stylistic characteristics of the artifacts closely resemble Helton phase materials from Koster (Jefferies and Butler 1982; Jefferies and Lynch 1983). The presence of a 1-m thick midden with no distinct sterile zones suggests the location was not abandoned for any length of time. The lithic assemblage from the Middle Archaic component includes projectile points of the Faulkner, Godar, and Matanzas types, and the debitage indicates a focus on tool refitting and maintenance rather than basic tool production. The site is notable for a wide variety of ground-stone tools including grooved axes, atlatl weights, grinding stones, and abraders. Excellent floral and faunal preservation at this site indicates a range of subsistence-related activities centered on the productive Saline River valley aquatic and riparian habitats as well as forest-edge and forested areas. The composition of the faunal assemblage points to year-round occupation of the site during the Middle Archaic. Bone remains also were used in the manufacture of engraved bone pins, which were recovered in quantity from the site. Plant remains indicative of species commonly exploited during the middle to late summer and fall are common, although evidence for year-round occupation is not clear-cut in the floral assemblage.

The total suite of data indicates the site was occupied on a year-round basis as a base camp during the Middle Archaic period. The importance of this location also was documented by the presence of at least 154 burials and structural post molds. There is little evidence for trade outside southern Illinois, and potential status markers indicate a relatively egalitarian society. Jefferies (1995), however, suggests that carved-bone pins—exhibiting stylistic similarities to those found on Middle Archaic sites in southern Illinois and Indiana, the lower Illinois River valley, and Missouri—indicate increased interregional integration and exchange during the Middle Archaic Helton phase.

Napoleon Hollow (Figure 2-1) is a multicomponent, deeply stratified site with prehistoric occupations dating to the Middle Archaic, Late Archaic, and Middle Woodland periods that is located on a colluvial fan at the base of the western Illinois River valley bluffs (Wiant and McGimsey 1986). Two Middle Archaic strata are recognized at the site in buried paleosols. The earliest Middle Archaic stratum has radiocarbon dates from dispersed charcoal ranging between 6800 and 6630 B.P. The upper Middle Archaic stratum has dates ranging between 6080 and 5140 B.P. based on charcoal recovered and dated from hearth features. The lower stratum yielded unnamed side-notched, straight, and concave-base projectile points while the upper stratum contained Matanzas and Godar side-notched types. The upper stratum is considered to be late Middle Archaic Helton phase (Wiant et al. 1983). Archaeobotanical analysis indicates a change in the percentage composition of nutshell taxa between the earliest Middle Archaic stratum, where pecan and black walnut are well-represented, and the later Helton phase stratum, where thick-shelled hickory comprises nearly the entire nutshell assemblage (Asch and Sidell 1988).

The five sites described above provide a substantial body of information about the Middle Archaic period in southern and western Illinois. As a group, these sites are similar in that all are located in the alluvial valleys of major rivers, have significant cultural features and extensive material assemblages, and provide evidence for more intensive use of the landscape when compared with Early Archaic sites. Evidence from Koster, Napoleon Hollow, and Modoc indicates shifts in subsistence, settlement, and material culture to more intensive occupations, more focused procurement of food resources, and more diverse assemblages of chipped-stone and ground-stone tools. The sites are notable in that basin-shaped pits and hearths are the most common archaeological features, but evidence for residential structures also is present.

Differences also are notable among these sites, however. Black Earth, Koster, Napoleon Hollow, and Modoc have been interpreted as base camps while Nochta is viewed as a temporary field camp. Both site types are expected for the Middle Archaic as component parts of a larger settlement system.

Emerson et al. (1986) have proposed a typology of Archaic period site types based on known examples that are expected to comprise an Archaic settlement system in the American Bottom region. Briefly, the model proposes that four distinct site types—base locales, base camps, residential base camps, and extractive loci—will be functionally linked into a settlement system. These site types are differentiated on the basis of size, the nature of the artifacts present, and whether the site reflects highly mobile or more sedentary residence (Emerson et al. 1986:250–252). This model, however, relies heavily on excavated Late Archaic sites located primarily in the Mississippi River floodplain. Upland sites, especially those located away from the bluff crest, are poorly understood at this time.

Geographic, material, and temporal differences among excavated Middle Archaic sites and their components have resulted in the definition of several phases in southwest Illinois (Figure 2-2). Many of the excavated data are from site components dating to the end of the Middle Archaic period. The Helton phase has been recognized across a broad area of the midcontinent as a late Middle Archaic cultural manifestation. The earlier portion of the Middle Archaic, however, is less well-known archaeologically and still requires significant refinement.

The 3000-year span of the Middle Archaic in southwest Illinois is an era of adaptation marked by gradual change in subsistence, settlement, and sociopolitical systems. The overall direction of the change is towards an increasingly sedentary lifeway centered on highly productive environments, particularly riverine settings. This conclusion, however, may be due in part to a near total lack of excavated upland Middle Archaic sites that could potentially reveal successful long-term adaptive solutions to less productive habitats present in interriverine uplands and minor tributary drainages.

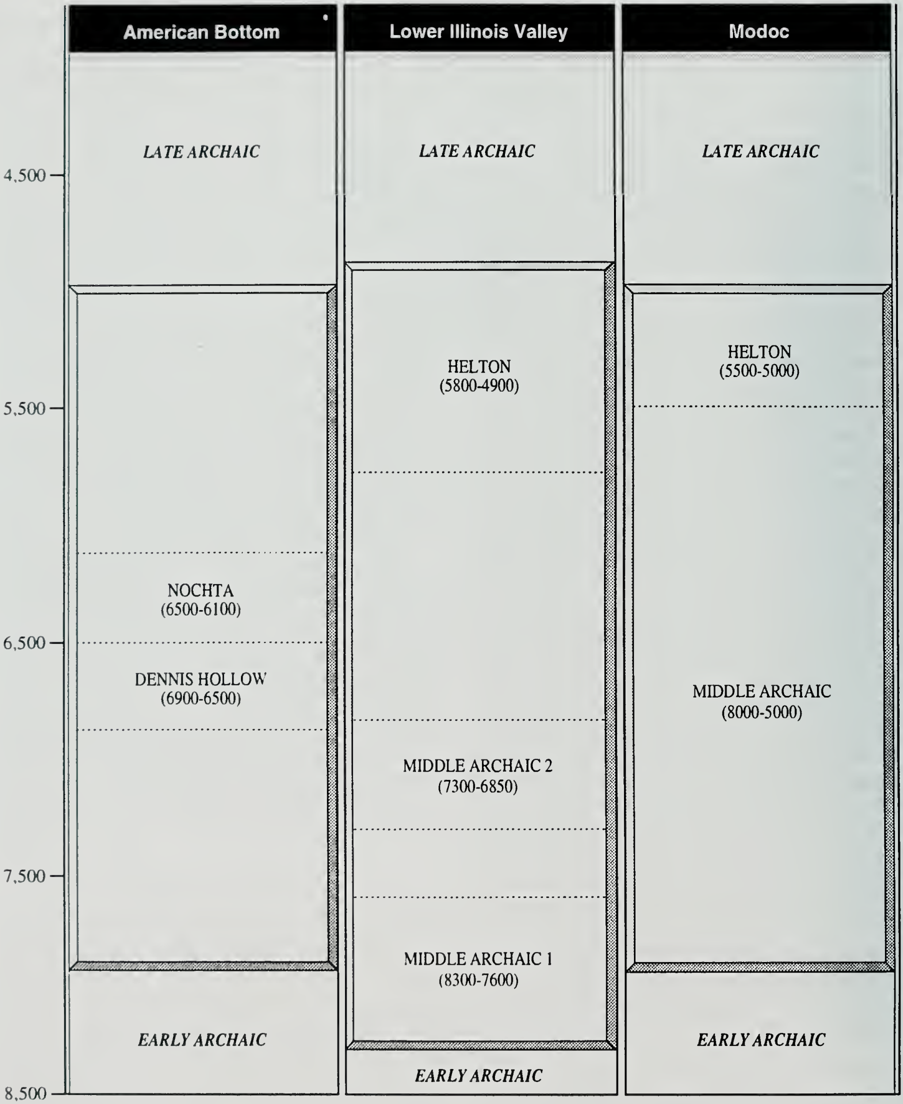

Figure 2-2. Middle Archaic Chronology in Southwest Illinois.

CHAPTER 3.
RESEARCH GOALS

Upon completion of Phase II testing at 14 of the sites identified within the Valmeyer relocation parcel, 11MO841 was recommended as eligible for listing in the NRHP (McGowan 1994; Volume I, this report). In July 1994 the Illinois Historic Preservation Agency concurred with that finding, and the Public Service Archaeology Program was asked to submit a data recovery plan for the Phase III mitigation of 11MO841 (Kreisa and McDowell 1994). Based on the results of the Phase II testing at 11MO841, a number of potential research issues were detailed that could be addressed with data obtained during Phase III mitigation of the site. The proposed research issues discussed in that document were based on an understanding not only of the data likely to be generated by additional excavations at 11MO841 but also on the state of current Archaic period research in the American Bottom and surrounding regions. These research issues are not intended as a comprehensive listing of the research potential of data collected from the mitigation of 11MO841, nor is it intended that the research issues outlined below necessarily can be addressed through the excavation of a single site.

Recently, Jefferies (1995) has presented an overview of the status of Archaic period research in the Midwest. In his overview, six areas of recent advances are highlighted: archaeobotanical studies, settlement organization, bioarchaeology and mortuary studies, technology, exchange and interaction, and environmental change. While not grouped according to these categories, the research goals proposed in the data recovery plan for 11MO841 addressed all but one of these issues, with bioarchaeology and mortuary studies being the single exception. Based on the data collected during the Phase II testing at 11MO841, five general areas were discussed in terms of the site's research potential. These five categories are chronology, site function, use of an adjacent sinkhole, subsistence, and the local Archaic period settlement system. Chronology includes both determining internal site chronology at 11MO841 and assessing the data in an attempt to create or refine regional Archaic period phases or subphases. Site function centers on determining the activities engaged in by site inhabitants and how those activities were spatially organized. Sinkhole usage addresses a unique aspect of the Valmeyer locality. Sinkholes are common in the karstic uplands of Monroe County, and one sinkhole is adjacent to the northeast edge of 11MO841. Limited Phase II testing indicated the presence of cultural materials in this sinkhole. Geomorphological investigations conducted during the Phase III investigations were intended to determine the depositional context of this material. Subsistence centers upon the reconstruction of the Archaic period subsistence strategy used by the occupants of 11MO841 and includes analysis of both faunal and archaeobotanical remains. Finally, settlement system analysis is intended to evaluate the role of 11MO841 within the local Archaic period settlement system. Each of these research goals is further discussed below.

Chronology

One of the major goals of the mitigation project undertaken at the Strong site was the recovery of data with which to place the occupation of the site into a temporal framework, without which no meaningful interpretation regarding the nature of the site or its function is possible. A precise local chronology linked to regional culture historical developments is necessary for any broader interpretation of the Strong site data set. Two means were employed to address the chronological placement of the Strong site: the collection of organic materials for radiometric assay and the typological analysis of temporally diagnostic artifact classes. The use of these two methods of chronological placement is necessary to integrate the excavated data successfully within their proper regional context and further serves to cross-check the validity of each method of age determination.

In the immediate American Bottom region, the local phase sequence begins with the Middle Archaic Nochta phase, 6650–6150 B.P., defined at the Nochta site (Higgins 1990). Dalton and Early Archaic presence in the American Bottom is limited, and no significant sites dating earlier than Nochta have as yet been documented. The Late Archaic period is well-represented on the bottoms and adjacent upland margins, with three phases—Falling Springs, Titterington, and Labras Lake—defined between 5000 and 3000 B.P. (Bareis and Porter 1984; Higgins 1990). In the lower Illinois River valley, the Archaic phase sequence begins about 9000 B.P. with the Early Archaic I phase. This is followed by the Early Archaic II phase dated between 8700 and 8450 B.P. Three Middle Archaic phases are defined between 8300 and 4900 B.P. These are the Middle Archaic I, 8300–7600 B.P.; Middle Archaic II, 7300–6850 B.P.; and Helton, 5800–4900 B.P. The Late Archaic Titterington phase begins at approximately 3900 B.P. (Brown and Vierra 1983; Stafford 1989). To the south of the Strong site, a sequence of occupations defined at the Modoc Rock Shelter includes an initial Early Archaic record beginning about 9300 B.P., Middle Archaic occupation levels dating between 8000 and 5000 B.P., and the Late Archaic Titterington phase beginning about 5000 B.P. (Ahler 1993; Ahler et al. 1992; Styles et al. 1983).

General age determinations are made through typological studies of all temporally diagnostic artifacts, in this case projectile points, with reference to defined types for the region. These data allow the integration and comparison of local sequences and types with regional data from which they were derived. Contextual information is also important in directing attention to potential instances of artifact contamination or disturbance which could potentially alter interpretations based on the presence of temporally diagnostic artifacts. Determination of projectile point types in concert with regional chronological sequences can allow the relative dating of site occupation.

Precise age determinations were obtained through radiocarbon assay of carbonized plant remains. Samples were collected during feature excavation, and those of adequate size and content were selected for radiometric age determination. All carbon samples were submitted to Beta Analytic, Inc. for conventional ^{14}C assay. Six radiocarbon dates were obtained from the Strong site which anchor the site's occupation in both the local and regional chronologic framework. The radiocarbon dates are reported as both conventional age before present (B.P.), calibrated age B.P., and calibrated calendrical age B.C. (Stuiver and Reimer 1993; Talma and Vogel 1993; Vogel et al. 1993). The two calibrated age estimates reflect advances in chronometric dating techniques that incorporate fluctuations in the atmospheric content of carbon isotopes over time.

Using the above noted combination of typological and chronometric dating techniques, the Strong site occupations are integrated into the existing framework for the midcontinental Archaic period cultural chronology, permitting the interpretation of the site in its proper archaeological context.

Site Function

The determination of site function can be divided into two related issues: potential activities conducted at 11MO841 and the internal patterning of those activities. Under the rubric of settlement organization, Jefferies (1995:127) indicates that this topic has long been a major research focus for the Archaic period. Documentation of site function draws on a number of different data sets and is itself a source of information for a number of other research issues.

Based on a review of previous research conducted at Archaic sites in the American Bottom, three site types can be identified. This model is for the most part based on data from Late Archaic period sites (see Ahler 1984 and Higgins 1990 for exceptions). These consist of large, permanently inhabited base camps located in the floodplain of the Mississippi River (Yerkes 1986), smaller seasonal encampments in the adjacent uplands (often having a large number of fire-cracked rock features [Abbott 1989]), and upland and floodplain sites with large clusters of pit features (Higgins 1990; McElrath 1986). The feature clusters alternatively have been interpreted to represent kin-based units or repeated occupation events. The upland and small floodplain sites have been interpreted to represent short-term, seasonal occupations at which inhabitants exploited seasonally available resources (e.g., Emerson et al. 1986; Nassaney and Lopinot 1986; Yerkes 1986). With data from 11MO841, the site can be compared to the above described model of Archaic period site function from the American Bottom. Such a comparison will allow the identification of an appropriate site type and modifications, if appropriate, to this model.

To address this research goal, two types of data will be analyzed. The type and quantity of artifacts will be analyzed in an attempt to identify on-site activities as will ecofacts such as faunal and archaeobotanical remains. In addition, the spatial patterning of the artifacts and ecofacts within features, as well as the spatial patterning of the features themselves, will be analyzed. Based on the model discussed above, 11MO841 is expected to be the result of repeated, short-term seasonal occupations. Analysis of materials from pit features can be used to identify feature function while archaeobotanical and faunal analyses will be used to identify major diet-related activities at the site. Faunal and archaeobotanical analyses also may be used to identify the season of occupation at 11MO841. The results of these analyses then can be compared to the model of Archaic period site types to address issues of potential differences in the use of floodplain and upland sites during the Archaic period. Additionally, data from this research issue will be used to evaluate Archaic period settlement systems, another research issue that is discussed below.

Sinkhole Usage

Phase II testing at 11MO841 indicated that archaeological material was located in the sinkhole at the northeast edge of the site (McGowan 1994; Volume I, this report). Sinkholes represent potentially rich and unique data sets for the investigation of issues regarding the prehistoric occupation of a site as well as general questions about changing environmental conditions in the area (Butzer 1982). It has been argued that throughout the Archaic, hunter-gatherers commonly established temporary sites on the edges of geologic features such as upland bogs and glacial kettle lakes to exploit rich aquatic plant and animal resources (Ferguson and Warren 1993; Hart and Jeske 1991; Kurz 1986). Botanical and faunal remains recovered from the sinkhole could provide information about potential resources available during the prehistoric occupation, and it was expected that archaeological material found in the feature would assist in understanding site function.

Major research questions addressed during Phase III investigation of 11MO841 concerned the origins and geomorphic history of the sinkhole and its potential utilization by prehistoric groups in the area. From an archaeological perspective, key issues to be addressed are whether the sinkhole existed during the Archaic period occupation of the site, whether it was a water-filled basin, and how and when artifacts were deposited in the sinkhole. In order to investigate these questions, the sinkhole was trenched and examined by a geomorphologist. It was anticipated that the analysis of sediments and cultural, botanical, and faunal remains would permit a detailed description of the age, genesis, and history of this feature. Further, palynological data, if preserved, were to be used in an analysis of pre-midden, midden, and post-midden deposits to determine if the environment around the sinkhole had changed through time.

Subsistence

Research on Archaic period subsistence patterns at 11MO841 draws on archaeobotanical and faunal remains. This issue has been one of the most innovative areas of Archaic period research in the past 25 years, both in terms of basic documentation of synchronic and diachronic patterns and in the archaeological conception of the nature of Archaic period cultures. Jefferies (1995:123–127) documents both the innovative techniques employed by researchers and the results of those efforts, for the most part in terms of advances in archaeobotanical research. Neusius (1986), Styles (1986), and Kelly and Cross (1984) document Archaic period faunal exploitation patterns for the lower Illinois River valley and the American Bottom.

In general, the faunal record of the American Bottom for the Archaic period is poor due to a lack of bone preservation. Kelly and Cross (1984) provide a sketch of faunal exploitation studies based mainly on information from floodplain sites and restricted to the Late Archaic period. Based on the limited data available, a generalized strategy has been posited (Kelly and Cross 1984:216). Neusius (1986) indicates that in the lower Illinois River valley, a generalized strategy may have been in place throughout the Archaic period, although the exploitation of white-tailed deer, mussels, and fish intensified during the period (see also Styles 1986). If preserved faunal remains are recovered from 11MO841, these data can be used to provide an understanding of faunal exploitation strategies in the American Bottom prior to the Late Archaic period or to evaluate and refine the Late Archaic period model of faunal exploitation proposed by Kelly and Cross (1984), Neusius (1986), and Styles (1986). The data also will provide a database from an upland Archaic period site, a site type poorly represented to date in discussions of American Bottom faunal exploitation strategies. Such an analysis can potentially provide details on site function, season of occupation, and the role of 11MO841 in the local settlement system.

The other means of approaching the study of Archaic period subsistence is through the analysis of preserved, charred botanical remains collected by systematic sampling and flotation processing of sediments recovered from cultural features. Systematic collection of flotation samples was undertaken during the excavation of 66 subsurface pits present at the Strong site. The advent of flotation sampling techniques during the 1960s (Struever 1968) and subsequent quantitative archaeobotanical analyses (Hastorf and Popper 1988; Miller 1988; Pearsall 1989; Wagner 1988) have allowed finer-grained resolutions to long-posited questions involving prehistoric diet, habitat preference, seasonality of occupation, and site function that were addressed only partially prior to the widespread adoption of these techniques (e.g., Caldwell 1958; Fowler 1959). Flotation sampling and subsequent archaeobotanical analyses have permitted archaeologists to begin to address questions of diachronic change in patterns of Archaic plant use at several levels of resolution from immediate site localities to broader regional approaches.

Previous research on Archaic period sites in the midcontinent has indicated that nuts, principally hickory nuts, contributed significantly to the overall Archaic period diet (Asch et al. 1972; Chapman and Shea 1981; Styles et al. 1983) but that other plants, including several weedy annuals with starchy or oily seeds, became increasingly common in Late Archaic period archaeobotanical assemblages. These are interpreted as evidence for an indigenous horticultural system based on the above-noted seeds and one or more indigenous varieties of squash/gourd (Asch and Asch 1985a; Smith 1992; Smith et al. 1992). Analysis of botanical remains recovered from the Strong site will permit an examination of the use of nuts and starchy and oily seeded plants that were potentially available to the site's occupants. Similarly, the habitats targeted for exploitation by the Strong site inhabitants will be reflected in the relative quantities of distinct floodplain or upland taxa that may have been deposited at the site. Seasonality of occupation also may be discernable on the basis of the presence of plant remains with distinct seasonal availability (Yarnell 1964). Seasonal determinations are often difficult to make, however, due to the rare preservation of soft tissues such as infloresences and leaves and the storability of seasonal resources such as nuts.

Analysis of the preserved archaeobotanical remains from the Strong site also can be used in comparing the assemblage with those of sites of similar age within and adjacent to the American Bottom region. Such comparisons may highlight similarities or differences in the spectra of plant resources utilized by contemporaneous Archaic populations, which in turn can reflect the environmental and cultural differences that are responsible for the assemblages (see Rossen and Edging 1987 for a similar type of analysis). Finally, the Strong site archaeobotanical assemblage may be placed within a diachronic context with respect to other midcontinental Archaic period sites and broader patterns of evolving man-plant relationships.

Settlement System

Winters (1969:110–111) defines settlement systems as the functional relationships between contemporaneous sites of a given culture. This definition is in part an effort to distinguish between settlement *patterns*, which are described as the distribution of sites across the landscape, and settlement *systems*, which attempt to describe both functionality of a given site and its relationship with other sites that comprise components of the system. Brown (1986:325–326), however, notes the existence of a number of often conflicting typologies and descriptions of Archaic settlement systems that result from site-based approaches to their definition and description and points out the need for new avenues of research into the nature of prehistoric settlement.

Archaic period studies long have emphasized attempts at reconstructing the settlement system within which a given site functioned and those adaptations necessary to allow the population to adapt to local conditions (e.g., Brown and Vierra 1983; Caldwell 1958; Emerson et al. 1986; Winters 1969). Patterning of site location across the landscape, differences in site size and/or density of occupation, and the presence or absence of specialized tool types or plant and animal species from specialized habitats all have been used in attempts to define prehistoric settlement systems. Consideration of a variety of data sets is necessary to reconstruct the Archaic settlement system adequately that included the Strong site. Previous research (Brown and Vierra 1983; Emerson et al. 1986; Fowler 1959; Winters 1969) has demonstrated the utility of regional approaches to settlement studies. Such studies enable a synchronic view of the components and the variation within regional settlement systems and allow for comparisons between adjacent regions. Similarly, diachronic studies within a given region allow for advances in understanding systematic adaptation to changes in the environmental, technological, or sociopolitical contexts within which settlement systems operate and adapt.

Directional, diachronic change has been documented in the midcontinental Archaic period archaeological record in terms of the appearance of increasingly sedentary settlement systems that rely more on logistical moves and scheduled exploitation of target resources within a given region as a means of meeting subsistence requirements rather than residential moves involving all or most of the group to exploit more evenly distributed resources. Using Binford's (1980) subsistence/settlement model, Early Archaic groups are characterized as residentially mobile foragers while Middle and Late Archaic populations are characterized as logistically organized collectors (Ahler 1984; Reeder 1988; Stafford 1991). Foraging-based settlement systems are associated with a subsistence system based on evenly distributed resources and are characterized by residential base camps and more ephemeral extractive locations. Logistical collecting-based systems are more complex and are associated with patchy target resource distribution patterns. Collecting systems generate five general site types: residential base camps, extractive locations, field camps, caches, and stations. Site types characteristic of each of these settlement systems can be recognized archaeologically on the basis of a site's physiographic setting, artifact/feature density and diversity, and subsistence remains (Binford 1980).

Earlier works have indicated that a trend toward increasing sedentism was underway by the Middle Archaic period and well-entrenched by the succeeding Late Archaic period in the midcontinent (Ahler 1984; Brown and Vierra 1983; Emerson et al. 1986; Stafford 1991). Explanations for the observed changes in settlement organization during the Archaic period generally involve discussions of subsistence base changes; alterations in the local environment, especially with regard to the mid-Holocene Hypsithermal Interval (Bettis and Hajic 1995:90–93; Hajic 1990); and growing population density in high-productivity environments along major river floodplains. Cleland (1976) has employed an evolutionary approach to categorizing prehistoric adaptations to the climax environments faced by the Archaic populations in the eastern woodlands and describes the Middle Archaic period as the beginning of a diffuse pattern of adaptation, within which seasonal scheduling of resource procurement leads to growing differences in site type, range of site size, permanence of occupation, and an increasingly diverse tool assemblage. This diffuse pattern is thought to be well-entrenched by the Late Archaic period, and Cleland (1976:70–71) describes the Riverton Culture of southeastern Illinois (Winters 1969) as an excellent example of a complex settlement system based on the structured, seasonal exploitation of a suite of diverse target resources from a series of specialized sites. Similar seasonal scheduling is apparent for Late Archaic populations residing in the American Bottom, where growing population density during the Archaic period and the closely juxtaposed high-productivity environments of the floodplain and adjacent uplands are cited as additional factors leading to increasing sedentism (Emerson et al. 1986; McElrath 1986).

Analysis of the chronological placement of the Strong site within a regional context, consideration of the site plan and floral and faunal resources present, and study of the breadth of the lithic tool assemblage are all integral to making interpretations regarding the settlement system within which 11MO841 functioned. In addition, the scale and direction of regional movements or interactions can be investigated through the identification of exotic artifacts such as nonlocal lithic materials that may be present at the site. These data then can be compared to other nearby sites of the same time period, allowing for an initial reconstruction of the settlement system. Once characterized, this settlement system pattern then can be compared with both earlier and later patterns previously identified in the region. Research to date on the midcontinental Archaic period indicates that this was a period characterized not by stability but by dynamic change in response to alterations in both the physical and sociocultural environments. Based on current evidence, a major subsistence/settlement shift appears to have been initiated around 8000 B.P. when highly mobile foraging groups shifted to a more sedentary, collecting economy focused on the exploitation of diverse, seasonally available target resources. It is anticipated that data collected from the Strong site will aid in refining this model of Archaic period settlement systems and their change through time.

Summary

Data recovery techniques used during the Phase III mitigation of the Strong site were designed to collect data that could be used to address the five topics discussed above. Heavy machinery, used to remove the disturbed plow zone from the site, revealed the presence of 66 pit features. These features were hand excavated, and all soils were screened through 6.4-mm mesh hardware cloth. Soil samples were taken from each feature. Trenching within the sinkhole adjacent to 11MO841 also was conducted under the supervision of a trained geomorphologist. These investigations yielded spatial and material archaeological data as well as geomorphological data from the sinkhole. The following chapters document the results of investigations, including analyses of artifacts and subsistence remains. The results of these analyses then are used to address the research issues discussed above, which are presented in Chapter 9.

CHAPTER 4.
EXCAVATION RESULTS AND FEATURE DESCRIPTIONS

Systematic surface collection of 23,200 m^2 within Valmeyer Addition 2 and the excavation of 13 machine trenches (both on- and off-site) during the Phase II evaluation of the Strong site documented an Archaic occupation that covered a 37,500 m^2 area (see Volume 1, this report). Surface materials were concentrated along the crest of the east/west-trending ridge and near the center of the relatively broad south-facing slope. The density of surface material decreased significantly at the steep slopes present on all sides. Three pit features were documented at that time, one of which contained a fully grooved axe. The features were distributed on the ridge top and well down the south-facing slope. Phase II data also indicated that a prehistoric midden might be present in a sinkhole at 2 m below ground surface. The Phase III mitigation focused on total documentation and recovery of in situ cultural remains.

Two excavation methods were used in the Phase III mitigation of the Strong site (Figure 4-1). First, investigations in the main site area, located on the east/west-trending ridge and south-facing slope, were conducted by stripping 38,275 m^2 from three large excavation blocks with a pan belly scraper. Surface and subsurface distributions determined from the Phase II investigations were used in deciding which area to strip. Two areas were left unexcavated in the main site area, forming breaks between the blocks. These breaks were the result of modern cultural features. The largest unexcavated area was located near the crest of the ridge between Excavation Blocks 1 and 2. This area, approximately 25 m wide, previously had been excavated for the construction of utility lines. Given the depth to which the utilities were excavated, any prehistoric features present would have been destroyed. No surface stripping was conducted in this 4,500-m^2 area to avoid damaging the utility lines. The second unexcavated area was a 5-m wide strip located between Excavation Blocks 2 and 3 on the south-facing slope that served as road access for the parcel. Construction and local traffic in this 750-m^2 area made stripping unfeasible.

The second excavation method was the use of a backhoe to excavate two small block/trench units in the sinkhole located on the northeast corner of the site. During the Phase II investigations, it was noted that the loess soils are subject to severe slumping in deep excavation units. A small block excavation unit allowed safe, detailed examination of the soil profile. Additional and deeper trenches were examined to ensure that the detailed block area was representative of the entire sinkhole and to identify any buried components. Results of the excavations at the sinkhole are presented at the end of this chapter.

Main Site Area Excavations

Three excavation blocks were examined in the main site area. The plow zone soils were stripped from all three by a pan belly scraper. The subsurface exposures were examined visually and shovel scraped to locate artifact and charcoal concentrations or areas of soil discoloration below the plow disturbance. All excavation blocks were excavated to at least 20 cm below the base of the plow zone. Excavation Block 1, roughly rectangular in shape, was located along the east/west-trending ridge crest and included both north- and south-facing slopes. This block extended 150 m east-west and 75 m north-south. A utility line right-of-way defined the southern limits of the excavation block. The eastern, western, and northern limits of the block were determined by a combination of factors including a decrease in surface material, an increase in slope, and the presence of trees. Excavation Block 2 also was rectangular in shape and measured 145 m east-west by 25 m north-south. This block was located near the crest of the east/west-trending ridge on its south face. This block was bounded by the utility line right-of-way to the north, a field/construction road to the south, and areas without artifacts to the

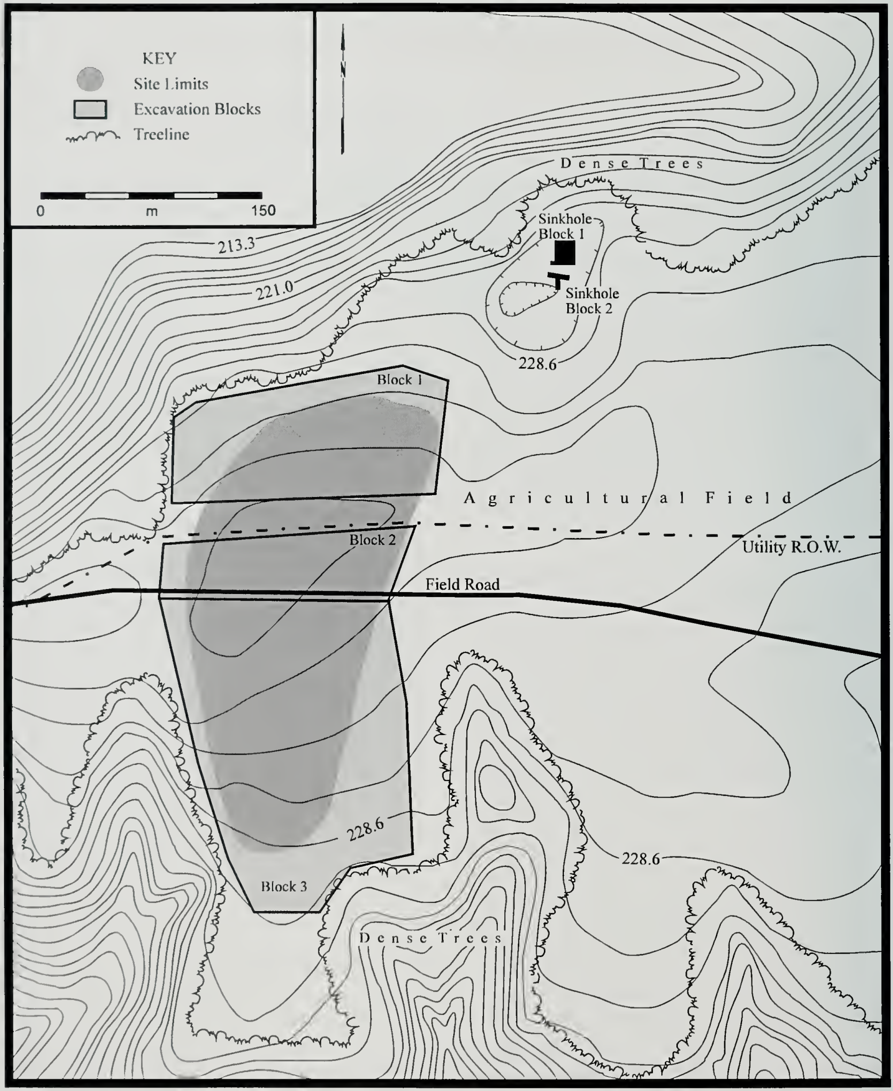

Figure 4-1. Excavations at the Strong Site.

east and west. Excavation Block 3, the largest area stripped, included most of the south-facing slope leading down toward Dennis Hollow. This excavation block covered an area 130 m east-west by 180 m north-south. Excavation limits were the field-construction road to the north and tree-covered slopes to the east, west, and south. A total of 38,275 m^2 was stripped and examined for features.

Sinkhole Area Excavation

Investigations of the sinkhole area consisted of the excavation of two small block/trench units. The largest unit was a square measuring 12-x-12 m in size. The entire block/trench was excavated to 1.5 m below the base of the sinkhole, and the south end of the unit then was excavated to 2.2 m below ground surface. The second block/trench unit was T-shaped. The east-west trench was 12 m long, and the north-south trench, 10 m long. Both were approximately 2 m wide. These units, together with those excavated during the Phase II investigations, provided a cross section of nearly the entire sinkhole.

A 1-m wide profile was documented along the south wall of Block/Trench 1, and eight soil strata were identified (Figure 4-2). This initial stratum (I) consists of a 65-cm-thick brown (10YR5/3) silt loam with zones of laminated very pale brown (10YR7/4) silt. Following this is a 40-cm-thick brown (10YR4/3) silt loam stratum (II) with brown (10YR5/3) mottles. The third stratum (III) is a 45-cm-thick dark yellowish brown (10YR4/4) slightly clayey silt loam with brown (10YR4/3) mottles and lenses of laminated brown (10YR5/3) silts. Stratum IV is 10–15 cm thick and is a dark grayish brown (10YR4/2) loamy silt stratum with yellowish brown (10YR5/6) clay inclusions. This stratum is underlain by Stratum V, a dark grayish brown (10YR4/2) clayey silt, 5–10 cm thick, with yellowish brown (10Y5/6) clay inclusions. The next stratum (VI) is a 5-cm-thick dark gray (10YR4/1) clayey silt with brown (10YR5/3) silt lenses. Below this is a brown (10YR5/3) clayey silt (Stratum VII). The deepest exposed stratum (VIII) is a yellowish brown (10YR5/5) clayey silt with yellowish brown (10YR5/4) silty clay mottles.

The sinkhole profile demonstrates that the cultural remains concentrated in the darker zone, Strata IV–VI, are redeposited. The upper 1.7 m of deposits are postsettlement alluvium/colluvium. The humus-rich zone is interpreted as redeposited A horizon material that has eroded from the surrounding upland as a result of historic agricultural practices. Informally, this buried humus-rich horizon is referred to as the 1830 paleosol (Richard Rieck, personal communication 1984). The entire post-settlement alluvium/colluvium deposit exhibits an inverted soil profile. The A horizon, which eroded from the upland first, is overlain by E, then B, and possibly C horizon material. The 1830 paleosol abruptly overlies the buried Holocene soil that developed in Peoria Loess. The fact that the 1830 paleosol has abrupt upper and lower boundaries suggests that is was deposited and buried relatively rapidly. The artifacts associated with Strata IV–VI, therefore, represent materials redeposited in the sinkhole as a result of historic agricultural practices rather than prehistoric refuse disposal behavior. Based on this interpretation, additional excavations were not conducted in the sinkhole.

This sinkhole profile and the results of the geomorphic borings at other sinkholes in the Valmeyer project area indicate that the sinkholes formed before the Pleistocene and that they were relatively free-draining throughout their history. For instance, no sedimentary bedding was observed in the soil that would suggest long-term ponding during the Holocene or rapid sedimentation. Rather, the fairly homogenous nature of the soil material reflects assimilative profile upbuilding from relatively slow accretion of sediment. Evidence of bioturbation, in the form of infilled, largely vertically oriented burrows and channels, is preserved in the Holocene soil.

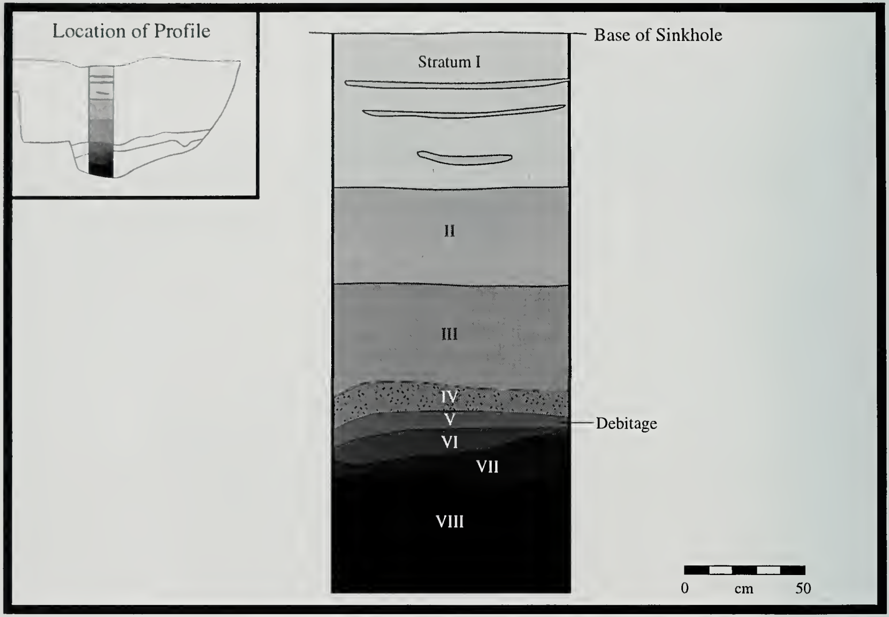

Figure 4-2. South Wall Profile of Block/Trench 1.

Feature Descriptions

During the Phase III mitigation of 11MO841, 66 cultural features were excavated after being exposed by machine stripping of the plow zone (Figure 4-3). These features all represent pits excavated into the site's surface during the period of prehistoric occupation. The pits are grouped into two categories: Class I pits with single fill zones (n=58, 88 percent) and Class II pits with multiple zones (n=8, 12 percent). Figure 4-4 illustrates the typical morphology of the pit features.

Feature fill at the Strong site has been pedogenically altered in such a way that it is nearly indistinguishable from the surrounding culturally undisturbed subsoil. Feature fill at the site was distinguished from the subsoil by the presence of charcoal and artifact concentrations. The pedogenic overprinting rates are such that within 6,000 years, prehistoric feature fill appears similar to the surrounding subsoil. In profile, the features often were distinguishable from the surrounding subsoil by leaching lines at the feature margin in addition to artifact and charcoal concentrations.

The features at the Strong site are all predominantly shallow basins with rounded to flattened bottoms and straight to rounded sides regardless of the number of internal fill zones present. Plan length and width were recorded in the field as were profile length, width, and maximum feature depth. Volume

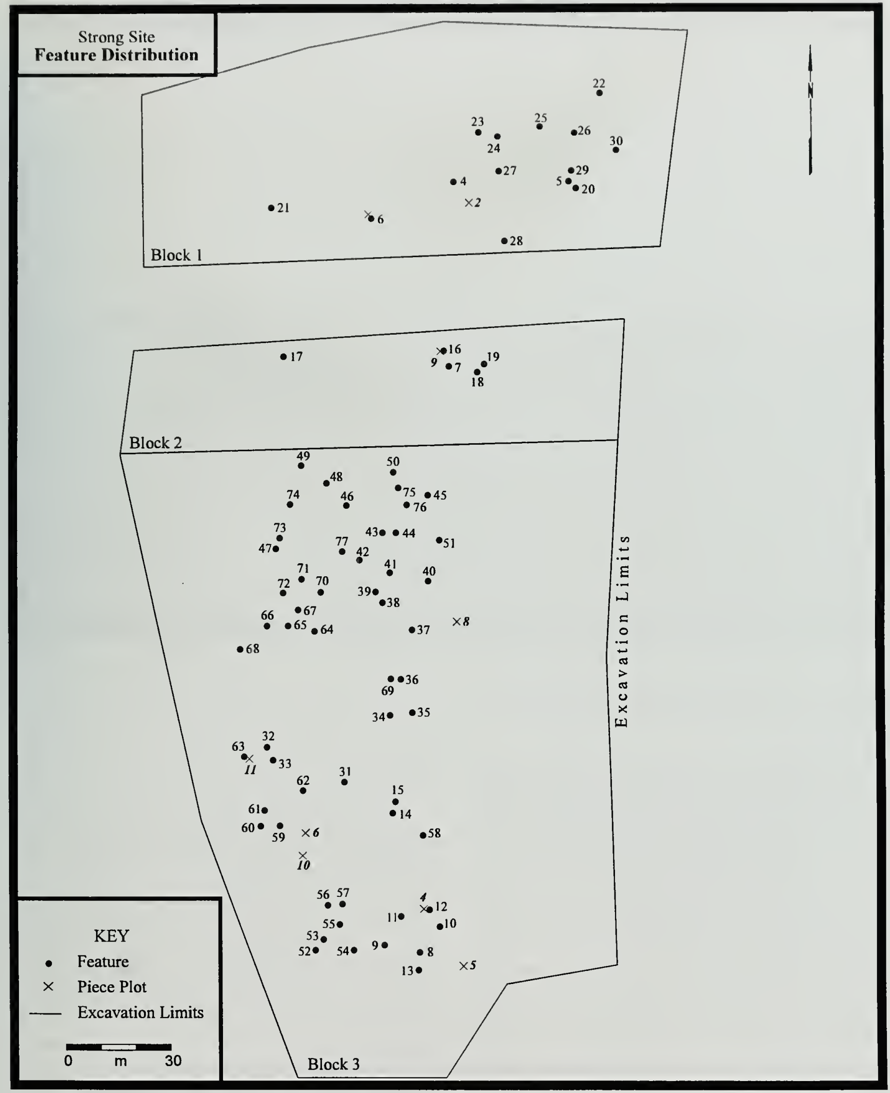

Figure 4-3. Feature Distribution at the Strong Site.

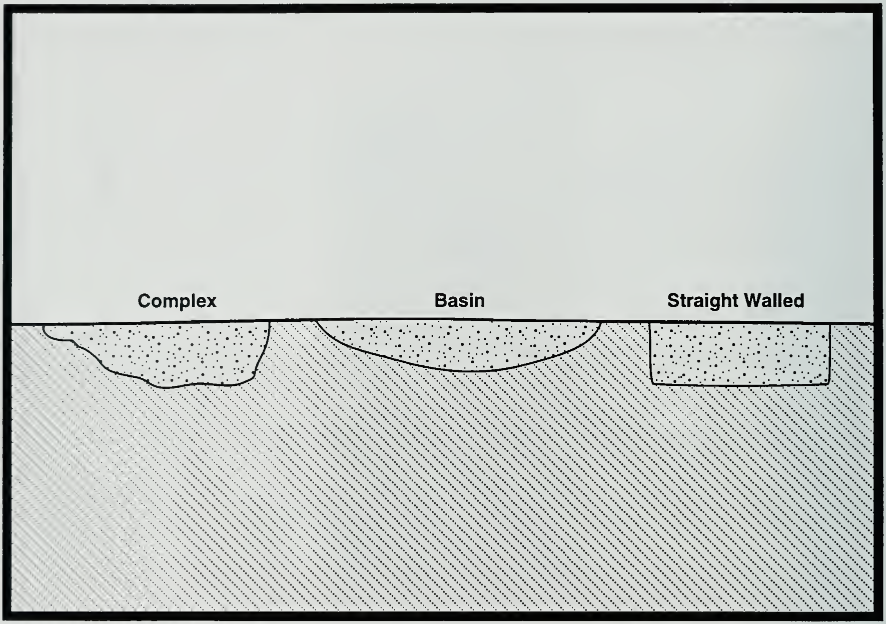

Figure 4-4. Typical Morphology of Pit Features.

measurements are not considered since these pits have been truncated to varying degrees by mechanical removal of the plow zone and upper subsoil sediments during the mitigation of the site and by a century of agricultural activity. Without consistent knowledge of the degree of this truncation, volume calculations may be misleading rather than informative with regard to proposed feature function and original morphology. Following the division of the features into two categories on the basis of internal fill zones, a series of cluster analyses was run as a means of assessing the validity of this method of feature analysis. The results of the cluster analysis did not contradict the division of the features on morphological grounds and provided no intuitively valid classification scheme.

Class I Pits

Fifty-eight of the excavated features at the Strong site are pits with basin-shaped profiles and single fill zones. These features are designated as Class I pits (Figure 4-5). Some degree of variation in profile shape is noted within this class of pits with respect to sidewall shape and other quantified attributes. Metrical attributes of these features are presented in Appendix A. Summary statistics are shown in Table 4-1. Sides vary from straight to basin-like, with a minority recorded as complex. The latter is intended to describe side walls that do not conform readily to the basin or straight descriptions. The fill of the Class I pits is only slightly more organic than the surrounding subsoil, and, in

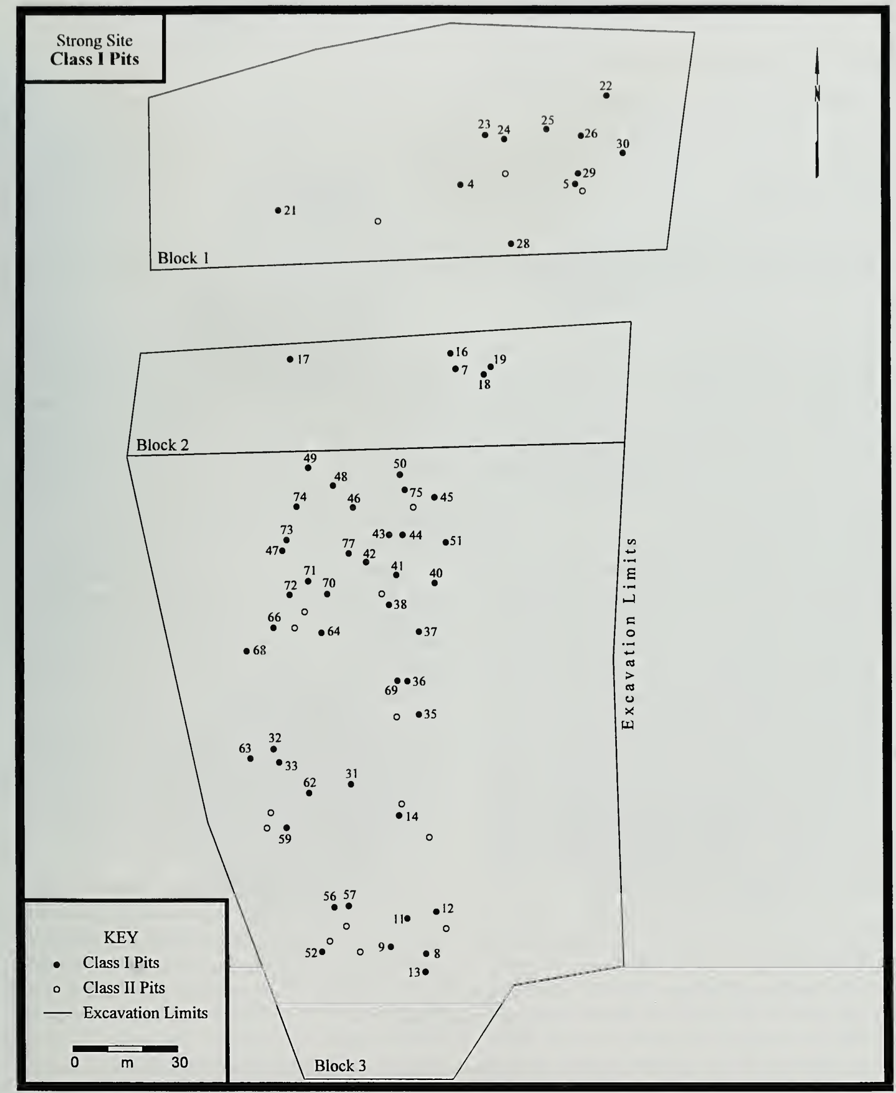

Figure 4-5. Distribution of Class I Pits.

Table 4-1. Summary of Pit Attributes for 11MO841.

Pit Class	Length min. (med.) max.	Width min. (med.) max.	Depth min. (med.) max.	Length/Width min. (med.) max.
Class I pits (n=58)	.53 (.895) 1.37	.42 (.785) 1.17	.06 (.220) .70	1.00 (1.130) 1.60
Class II pits (n=8)	.65 (.810) 1.15	.55 (.770) 1.10	.22 (.300) .50	1.02 (1.080) 1.82

Note: All measurements in meters; min. = minimum, med. = median, max. = maximum.

many cases, the pit margins were difficult to define on the basis of soil color and texture. This is likely due to significant leaching of soluble organics through time and the pedogenic overprinting of soil horizons. These features do not show evidence of in situ burning, which often is readily identified by the presence of burned or oxidized sediments within or adjacent to the pit margins.

Figures 4-6 and 4-7 illustrate representative plan and profile drawings for four Class I pits, features 14, 16, 36, and 45, each of which is briefly described here. Feature 14 was recognized as a roughly circular dark stain on the machine-stripped surface. This feature is approximately 83-x-74 cm in plan view, with chert fragments and charcoal flecks visible at the top of the pit. When profiled, the maximum depth was 29 cm below the stripped surface, and the feature was defined as a basin with a single fill zone (Figure 4-6, top). The fill contained chert debitage, a single biface, and charcoal, and was described by the excavators as nearly indistinguishable from the surrounding subsoil matrix.

Feature 16 is a circular pit with maximum dimensions of 90-x-85 cm in plan view. When exposed by machine stripping, a charcoal concentration was noted at the top of the feature along with the base of a corner-notched projectile point, identified as Valmeyer Corner Notched, a newly defined type recovered from this site (see Chapter 5). The south half was excavated first to expose the north profile, which revealed a basin-shaped pit with a maximum depth of 40 cm below the stripped surface. Artifacts recovered from this pit include chert debitage, fire-cracked rock, and charcoal. The north profile indicated that this pit, while formally defined as single zone, contained differential amounts of lithic debris and charcoal flecking within this single zone. These differences are depicted as A^1 and A^2 in the profile illustration (Figure 4-6, bottom).

Feature 36 is similar in plan shape and size to the above described Class I pits having maximum plan dimensions of 93-x-89 cm (Figure 4-7, top). The east half of this pit was excavated first to reveal the west profile. In profile the feature was found to be basin-shaped with a maximum depth of 30 cm below the stripped surface. The single fill zone contained abundant charred hickory nutshell along with chert debitage. A concentration of fire-cracked rock weighing 157.8 g was located near the base of the feature, but no evidence of in situ burning was noted during the excavation of this pit.

The final Class I pit illustrated, Feature 45, was defined as a circular stain approximately 103-x-97 cm in plan view that was in part defined on the basis of lithic debris and charcoal flecks visible on the stripped surface. When profiled, this feature was found to extend 41 cm below the machine-stripped surface (Figure 4-7, bottom). The single fill zone contained a thin biface fragment and three projectile point base fragments, two of which are Valmeyer Corner Notched varieties and one is a Robinson side-notched base fragment.

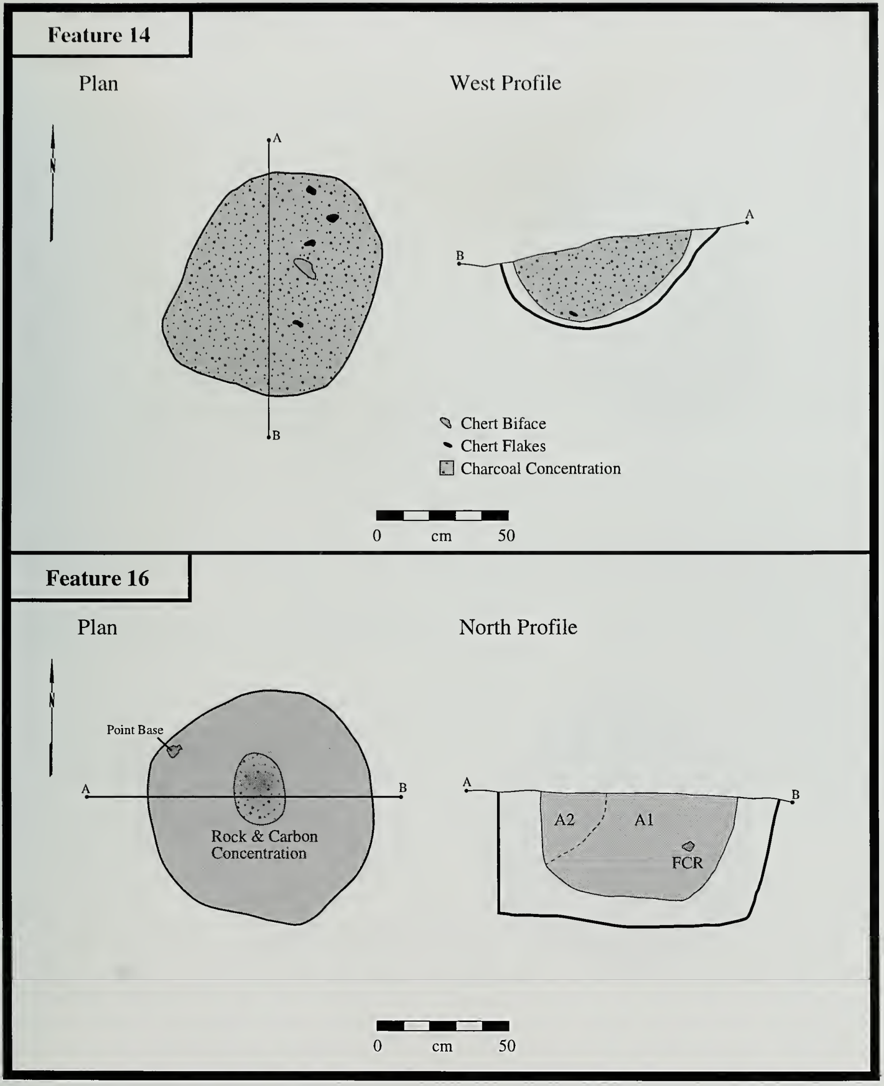

Figure 4-6. Representative Plan and Profile Views of Class I Pits: Features 14 (at top) and 16 (at bottom).

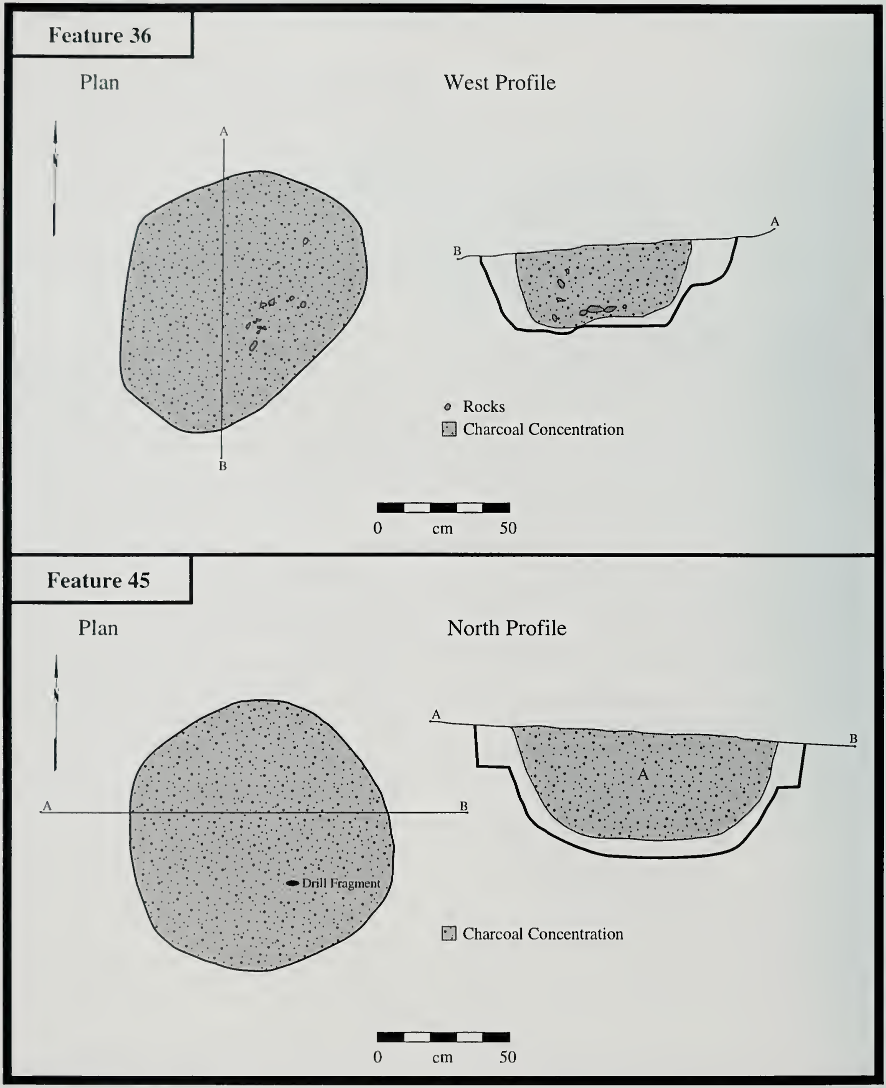

Figure 4-7. Representative Plan and Profile Views of Class I Pits: Features 36 (at top) and 45 (at bottom).

Class II Pits

The remaining eight features excavated at the Strong site are characterized by two or more fill zones and are designated as Class II pits (Figure 4-8). As a class these are similar to the Class I pits in metrical attributes, except they contain multiple fill zones. The presence of multiple distinct fill zones within pit features may reflect the nature of their intended function, as in cases where basal fuel zones are defined on the basis of abundant charcoal or evidence of in situ burning. Alternatively, multiple zones may indicate that a pit feature was infilled gradually, if sterile sediments are deposited over artifact-bearing zones in a single episode or if general habitation debris are abundant in a particular fill unit. Side walls again vary from straight to basin shaped among the Class II pits, and pit floors also vary from straight to slightly basin shaped. Summary statistics are presented in Table 4-1, and the metrical data are presented in Appendix A. None of the Class II features shows evidence of in situ burning. Representative plan and profile drawings are shown in Figures 4-9 and 4-10, and each of the illustrated features is briefly described below.

Feature 10 was identified as a circular stain approximately 92-x-90 cm in plan view that was exposed at the machine-stripped surface. Charcoal flecks, chert debris, and a small amount of burnt clay were noted on the surface of this feature. Following the excavation of the south half of the pit, the resulting profile revealed a basin-shaped feature about 30 cm deep with three fill zones (Figure 4-9, top). The uppermost fill zone, Zone A, contained lithic debris, the distal tip of a projectile point, and charcoal flecks within a silty clay loam matrix. The middle zone, Zone B, also contained chert debris and charcoal within a silty clay loam matrix. The basal zone, Zone C, contained similar artifacts but was found to have a more clayey matrix similar to that of the surrounding sterile subsoil.

Feature 27 was identified as a circular stain 115-x-110 cm in diameter exposed on the machine-stripped surface. The north half of the pit was excavated first, revealing the south profile. In profile Feature 27 was found to contain two fill zones and to extend to a maximum depth of 39 cm below the stripped surface (Figure 4-9, bottom). The uppermost zone, Zone A, was basin-shaped and contained lithic debris, burnt clay, and some charcoal flecking within a silty clay loam matrix. Zone B also contained chert debris and charcoal, but in lesser amounts than recovered from Zone A. As was the case for the majority of pits excavated at the Strong site, this feature was difficult to define from the surrounding sterile subsoil on the basis of soil color and texture, and the presence of charcoal and chert debris were relied on to determine the margins of this feature.

Feature 39, exposed as a circular stain approximately 108-x-99 cm in diameter, extended 27 cm below the stripped surface and contained two fill zones. When exposed in plan view, chert debris and small limestone fragments were noted at the top of this pit. Following the excavation of the east half of the feature, the profile revealed two fill zones (Figure 4-10, top). Zone A is basin-shaped and accounts for the majority of the pit itself. This zone contained chert debris and nut charcoal, along with several rocks within a silty clay loam matrix. Zone B was defined as a darker brown basin-shaped zone visible in the southern portion of the profile. Both zones A and B contained chert debitage and charcoal flecks.

The final Class II pit illustrated, Feature 55, was exposed as a circular stain approximately 73-x-66 cm in diameter on the machine-stripped surface. The south half of the feature was excavated first to expose the north profile. In profile, this feature was found to extend 50 cm below the machine-stripped surface and to contain two fill zones (Figure 4-10, bottom. Both zones A and B contained lithic debris and light charcoal flecking within silty clay loam matrices that were difficult to delineate on the basis of soil color and texture.

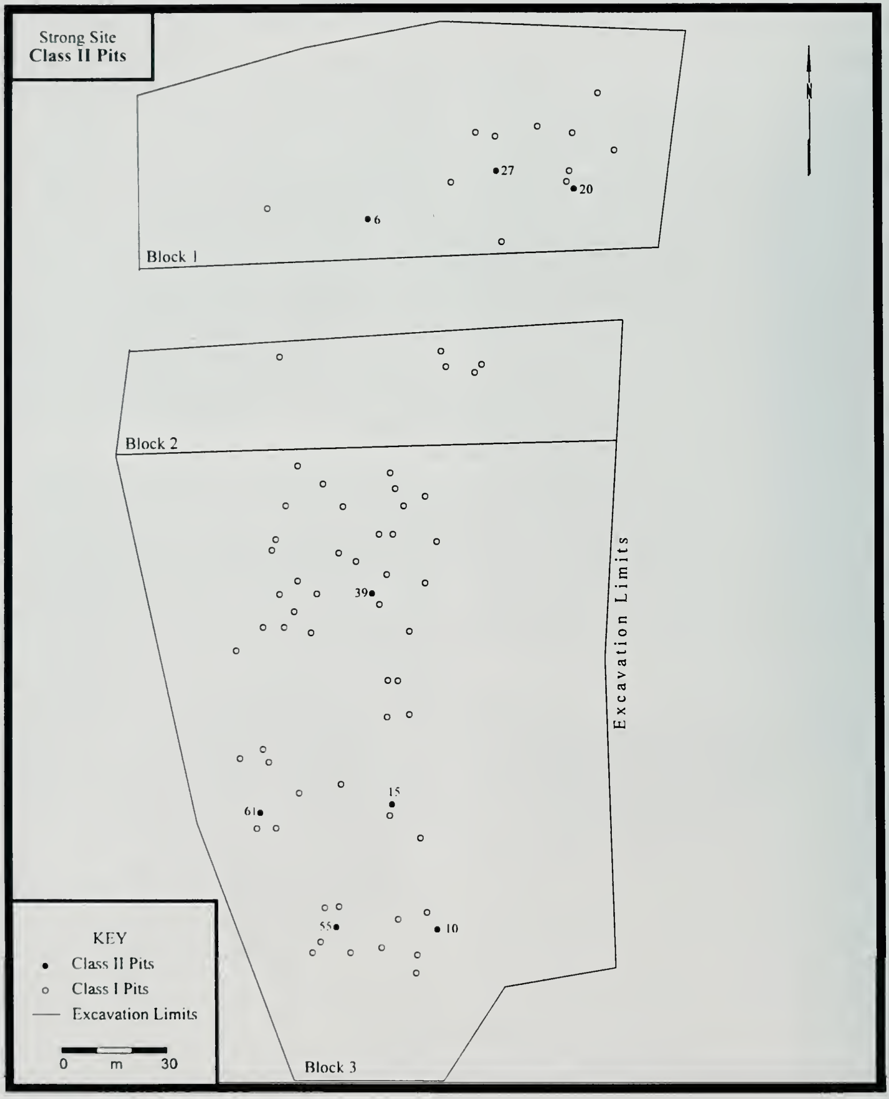

Figure 4-8. Distribution of Class II Pits.

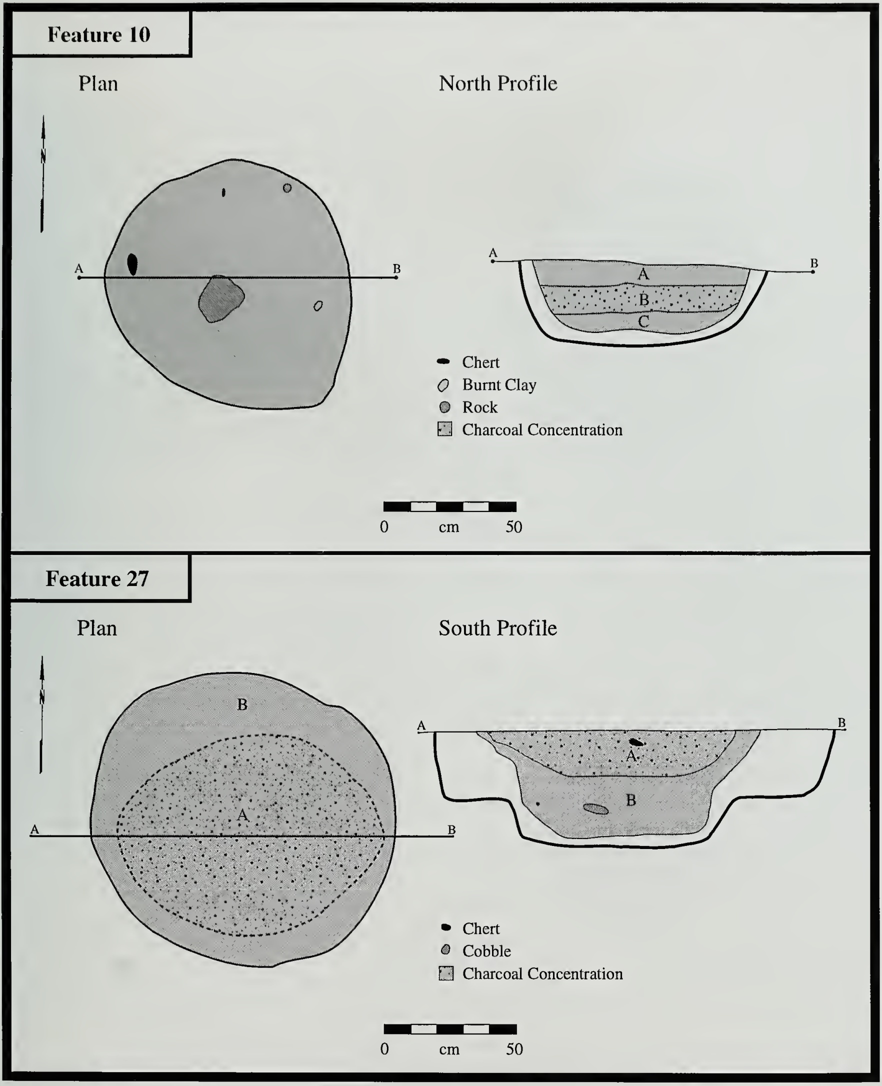

Figure 4-9. Representative Plan and Profile Views of Class II Pits: Features 10 (at top) and 27 (at bottom).

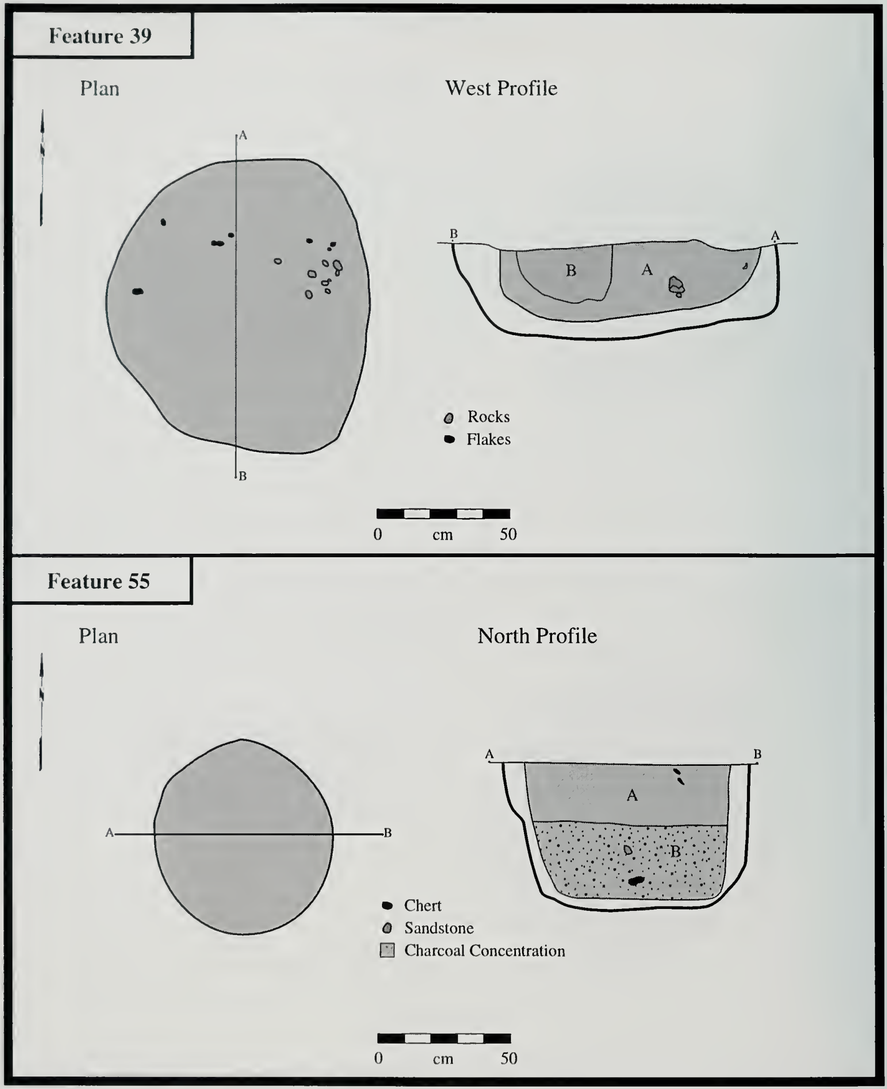

Figure 4-10. Representative Plan and Profile Views of Class II Pits: Features 39 (at top) and 55 (at bottom).

Pit Function

The excavated features exhibit a fair range of variability in terms of size and depth, but the significance of these differences is difficult to assess and interpret. Presumably, the observed differences in feature size, and to a lesser extent shape, relate to some functional or temporal differentiation among these pits. Some degree of uncontrolled variation also is likely introduced simply by individual effort in constructing the features for their initial function. Thus, pits of varying size and depth may have been intended for the same or similar functions, and the observed variation is simply incidental. Addressing functional differences is further hampered by the generally homogenous fills, which consist of lithic debris, occasional limestone fragments, and charred nutshell.

Overall, these pits are similar to those excavated from the Middle Archaic component at the Nochta site, which is located in the northern American Bottom (Higgins 1990). At Nochta 131 of the 214 Middle Archaic pit features are described as single-zone basins. The upland McLean site, located near Columbia, Illinois, also produced a large number (n=161) of pits with similar morphology to those from 11MO841 dating to the Late Archaic Falling Springs phase component. At McLean, the pits are interpreted as nut processing or storage features given the presence of charred nutshell and anvil or nutting stones within the artifact assemblage and the absence of faunal remains in their fill (McElrath 1986:82).

Feature Clusters

While several alternative functions of the pits can be suggested, the spatial patterning of the pits at the Strong site appears to be more straightforward. Four distinct feature clusters containing from 4 to 33 associated pits are discernable within the excavation blocks (Figure 4-11). Each of the four identified clusters of pits also includes open areas between excavated pit features. These open areas may indicate the location of discrete activity areas that were associated with the pits. Also associated with several of these pit clusters are a number of piece-plotted lithic tools that were located outside the limits of defined features. The northmost feature cluster, Feature Cluster 1, consists of 12 pits, ten of which are single-zone Class I type. Features 20 and 27 are the only Class II features within Cluster 1. Feature Cluster 1 is roughly circular and approximately 50-x-65 m in extent. This cluster has a single radiocarbon date obtained from Feature 22 of 6680±80 B.P.

Feature Cluster 2 is located 25 to 30 m south of the southern limits of Cluster 1 and is composed of four Class I pits. This cluster is significantly smaller than the other identified clusters, measuring approximately 12-x-25 m. This cluster also has a radiocarbon-dated pit, Feature 16, with a date of 6870±80 B.P. Feature Cluster 2 is separated from Feature Cluster 1 by a natural gas pipeline that cuts across the site area. It is possible that this cluster represents the southern extent of Feature Cluster 1.

Feature Cluster 3 contains the largest number of features (n=33) within any of the identified clusters. Thirty-one of these are Class I single-zone pits while only two, Features 27 and 39, are Class II multizone features. Feature Cluster 3 is roughly circular, with the features distributed within an area approximately 80-x-90 m in extent. Two radiocarbon dates were obtained from Cluster 3. Feature 45 produced a date of 6780±70 B.P., and Feature 36 was dated at 6560±90 B.P.

Feature Cluster 4 is the southmost feature cluster identified within the machine-stripped area of the Strong site. Cluster 4 consists of 19 features within an oval area approximately 65-x-100 m in size. Fifteen of the pits within this cluster are single-zone Class I pits, and the remaining four—Features 10, 15, 55, and 61—are multizone Class II features. Two radiocarbon-dated pits are associated with Cluster 4. Feature 61, one of the Class II pits, pro-

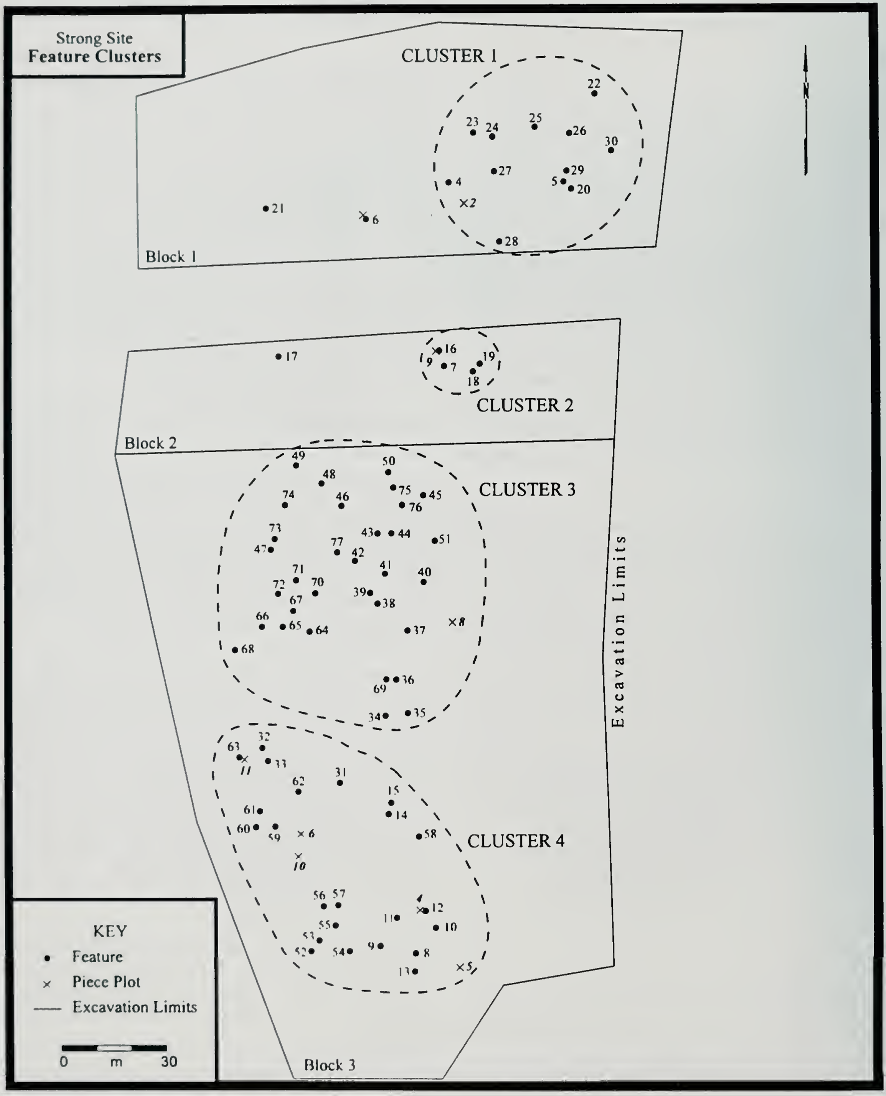

Figure 4-11. Feature Clusters at the Strong Site.

duced a date of 6760±70 B.P., and Feature 10, also a Class II pit, produced a date of 6630±80 B.P.

Several possibilities exist for the formation of the identified features clusters. First, each cluster may represent the facilities constructed and utilized by social or lineage segments within a single corporate group during the period of occupation at the site (e.g., McElrath 1984). Second, the clusters may represent the reoccupation of the site area through time by one or more groups as part of a seasonal round. Finally, these apparent feature clusters may in fact simply result from fortuitous, nonpatterned behavior due to successive use of this location through time.

Given the span of nearly 400 years in the radiocarbon dates obtained from the site, the second explanation, that the clusters reflect the reoccupation of the site over time, seems to be most parsimonious for the observed feature distribution. Under this scenario, the feature clusters represent groups of associated pits and activity areas constructed and utilized during temporally discrete occupations of the site. These occupations thus represent only a portion of a larger settlement system which is composed of an as yet unknown range of site types and locations. The homogeneity of the features excavated at the site suggests that the nature of tasks undertaken at 11MO841 was relatively unchanged during the course of the site's occupation during the Middle Archaic period. This pattern suggests that the site is best interpreted as a special function locus rather than one at which a wide variety of tasks were being undertaken. As such, the Strong site is best conceptualized as an extractive camp within Binford's (1980) scheme of site categorization or alternatively, as a residential extractive camp in terms of the model proposed by Emerson et al. (1986). Given the site's location in the uplands and the general reliance on hickory nuts during the Archaic period, the Strong site likely functioned as a fall nutting camp; the pits likely were used to store or process the nut mast. Following the cessation of their intended function, the pits were infilled, probably fairly quickly based on the absence of sterile fill zones or obvious laminated sediments, with general debris from the site area.

Strong Site Radiocarbon Dates and the Dennis Hollow Phase in the Southern American Bottom

Six features selected from the Strong site for radiometric dating place the occupations of this site in the early portion of the Middle Archaic period and, when combined with the presence of distinctive projectile points, serve to anchor a newly defined Middle Archaic phase in the southern American Bottom region. The six features selected for dating met one or more of the following criteria: presence of diagnostic artifacts within the fill, adequate quantities of charred materials to assure accurate age determinations by standard radiocarbon assays, and typological and spatial representativeness of the features present within the site. The six features selected (10, 16, 22, 36, 45, 61) each met one or more of the above criteria (Figure 4-12).

All six samples submitted for dating were comprised of carbonized material that was hand-collected during feature excavation. All such samples then were visually inspected in the lab to assess the amount and type of carbon present. In this way, many of the collected samples were eliminated from consideration based on the small quantities of charred material present. In general, the charred botanical remains were poorly preserved at 11MO841 due to the acidic loess soil matrix. The samples submitted for age determination all were composed largely of charred hickory (*Carya* spp.) nutshell fragments, with black walnut (*Juglans nigra*) shell present in one of the samples (Feature 61). Wood charcoal identified as oak (*Quercus* spp.) and other ring-porous hardwood also is present in small quantities in several of the samples, but nutshell predominates because of its greater density and survival of postdepositional processes.

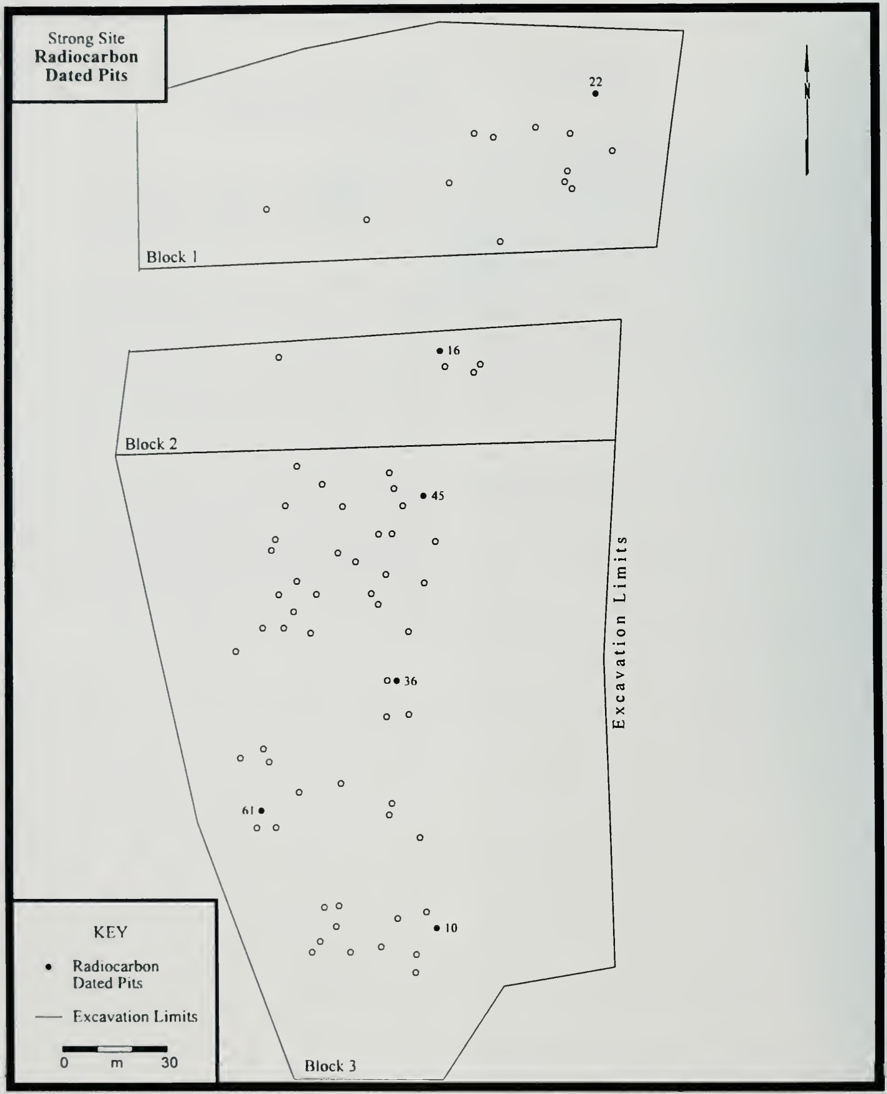

Figure 4-12. Locations of Features from Which Radiocarbon Samples Were Collected.

The resulting conventional radiocarbon dates, calibrated ages, and calibrated calendrical ages for each are presented in Table 4-2. The conventional age determination represents the measured years before present (1950) and includes a one standard deviation error factor. Estimates of $^{12}C/^{13}C$ fractionation ratios were made for each sample on the basis of typical values for wood and nutshell in North America. The two calibrated age estimates, calibrated age B.P. and calibrated calendrical age, are based on dendrochronological calibrations obtained on North American samples (Vogel et al. 1993).

Radiocarbon Sample Descriptions and Contexts

Feature 10, a Class II pit with three internal fill zones, produced a conventional radiocarbon age of 6630±80 B.P. (Beta-84740) (Table 4-2). A 15.9-g sample consisting of hickory nutshell and a small amount of ring-porous hardwood (probably oak) charcoal was collected during excavation. The pit had a maximum depth of about 30 cm, a basin-shaped profile, and contained lithic debris in addition to the charcoal and 290.1 g of fire-cracked rock. The middle fill zone, Zone B, was ashy and contained the bulk of charcoal and artifacts recovered from Feature 10. Zones A and C also contained material, but the matrix of these fill units was clayey and contained lesser amounts of cultural material.

Feature 16, a 40-cm deep Class I single-zone pit, dates to 6870±80 B.P. (Beta-84741) (Table 4-2). Charred hickory nutshell and a few fragments of oak weighing 21.9 g were collected for radiometric dating. This feature was about 90-x-85 cm in plan and contained charred material, lithic debris, and fire-cracked rock. A corner-notched/expanding-stem projectile point base was collected from the north half of this feature. This point fragment is identified as a Valmeyer Corner Notched variety, a type defined for a series of distinctive, well-made corner-notched points recovered from the Strong site in Middle Archaic contexts.

Feature 22, a 23-cm deep Class I pit, was dated to 6680±80 B.P. (Beta-84742) (Table 4-2). This feature contained hickory nutshell and lithic debris within the single fill zone. A total of 26.3 g of hickory nutshell was collected and submitted for radiometric assay.

Feature 36, a Class I pit, produced a date of 6560±90 B.P. (Beta-74743) (Table 4-2). This feature is described as containing nutshell and wood charcoal within its single fill zone. This pit was approximately 90 cm in diameter with a maximum depth of 30 cm. A concentration of fire-cracked rock totaling 157.8 g was noted near the base of this pit. A sample of 18.8 g of charred hickory nutshell was collected and dated from this feature.

Feature 45, also a Class I single-zone pit, was dated at 6780±70 B.P. (Beta-74744) (Table 4-2). Approximately 1 m in diameter, this basin had a maximum depth of 41 cm below the stripped surface. Hickory nutshell and a few fragments of ring-porous hardwood weighing a total of 20.4 g were submitted for the radiocarbon assay. Three projectile point bases and a thin biface fragment were recovered along with the nut and wood charcoal. Two of the point fragments are defined as Valmeyer Corner Notched, and the third as a Robinson side-notched variety.

The final feature dated at the Strong site, Feature 61, is a Class II pit with two fill zones. A date of 6760±70 B.P. (Beta-74745) (Table 4-2) was obtained on a 41.5-g sample of walnut and hickory nutshell. The upper fill zone, Zone A, contained the majority of artifacts and charcoal recovered from this feature. The pit was approximately 75 cm in diameter and had a maximum depth of 30 cm.

The conventional ^{14}C age range for the site is between 6560 and 6870 B.P., with calibrated ages ranging between 7390 and 7650 B.P. (Table 4-2). The radiocarbon age determinations obtained for the Strong site place the occupations during the early portion of the Middle Archaic period as it is pres-

Table 4-2. 11MO841 Radiocarbon Dates.

Sample ID	Feature	Conventional ^{14}C Age (B.P.)	Calibrated Age[a] (B.P.)	Calibrated Calendrical Age[b] (B.C.)
Beta-84740	10	6630±80	7520, 7500, 7470	5520
Beta-84741	16	6870±80	7650	5700
Beta-84742	22	6680±80	7530, 7490, 7480	5580
Beta-74743	36	6560±90	7390	5450
Beta-74744	45	6780±70	7570	5620
Beta-74745	61	6760±70	7550	5605

[a] Using calibrations of Stuiver and Reimer 1993.

[b] Using calibrations of Vogel et al. 1993; Talma and Vogel 1993; Stuiver et al. 1993.

ently constructed in the midcontinent. Middle Archaic age determinations also have been obtained from Nochta (Higgins 1990), and Modoc Rock Shelter (Ahler 1993; Styles et al. 1983). Four radiocarbon assays from Nochta span approximately 700 years: 6180±120 B.P., 6450±120 B.P., 6490±90 B.P., and 6890±170 B.P. (Higgins 1990:108). These dates overlap in part with those from 11MO841. Undated Dalton and Early Archaic components also are present at Nochta. The Nochta phase, 4550–4150 B.C. (c. 6500–6100 B.P.), has been proposed for the Middle Archaic occupations of the American Bottom as represented at Nochta Uncorrected Middle Archaic dates at Modoc range between 8000 and 5000 B.P. but generally fall earlier than those obtained from Strong and Nochta (Ahler 1984:112, 1993; Styles et al. 1983:9). Early Archaic and Late Archaic occupations also are present at Modoc.

Middle Archaic components have been reported from a number of sites in the Lower Illinois River Valley including Koster (Brown and Vierra 1983), Quasar (Goatley 1992, 1995), DOC (Stafford 1991), and Elizabeth (Charles et al. 1988). The dates from the Strong site fall within the chronological gap separating the later portion of the Middle Archaic 2 phase and the early Middle Archaic 3 phase as proposed for the lower Illinois valley. Defined on radiocarbon assays obtained from Koster, the Middle Archaic 2 spans 7300–6850 B.P. and Middle Archaic 3 dates from 6500–5800 B.P. (Brown and Vierra 1983:9). Quasar, DOC, and Elizabeth fall in the Middle Archaic 3 or later Helton phase of the Middle Archaic in the lower Illinois River valley.

Given the tight clustering of dates at the Strong site and the distinctive Valmeyer Corner Notched projectile points recovered from both feature and surface contexts, a new Middle Archaic archaeological phase, Dennis Hollow, is proposed for the region. The Dennis Hollow phase as presently defined dates between 6900 and 6500 B.P. This predates the Nochta phase (c. 6500–6100B.P.) in the American Bottom region and partly overlaps the Middle Archaic 2 and Middle Archaic 3 phases in the lower Illinois River valley. At present, Strong represents the only identified Dennis Hollow phase site in southwestern Illinois, and the spatial extent of the proposed phase is yet to be established. Corner-notched projectile points similar to the Valmeyer Corner Notched points recovered at Strong are reported from Middle Archaic strata at Modoc (Steven Ahler, personal communication 1996) but have not been reported from sites in the American Bottom where the Nochta phase currently represents the earliest defined occupational phase. The Dennis Hollow phase will be more fully defined in Chapter 9 of this report.

CHAPTER 5
LITHIC ANALYSIS

Lithic remains represent the single largest artifact set recovered from the Strong site (n=16,840; Appendix B). These remains consist of chipped-stone artifacts (tools and chipping debris), cobble tools, ground-stone tools, and a variety of miscellaneous materials. Lithic artifacts can be used to address several issues relating to the occupation of a prehistoric site. In this chapter, these artifacts will be used to investigate questions of site chronology, function, and lithic raw material utilization.

Although the primary source of information regarding site chronology at 11MO841 is derived from radiometric dates, diagnostic projectile points can complement this information. Projectile points have been identified through comparisons with defined types throughout the Midwest, particularly in the American Bottom region.

Site functions can be inferred through the examination of several characteristics of the lithic assemblage. In this chapter site functions are proposed on the basis of the presence and proportions of artifact and debitage types. In addition, artifact and debitage data are incorporated into models of lithic manufacturing systems which permit conclusions regarding stages of artifact production represented at the site (see Volume 1, Chapter 5). It is anticipated that the identification of site activities will allow conclusions to be drawn regarding the possible role of 11MO841 in the Middle Archaic settlement system in this area.

Another issue addressed in this chapter is the pattern of chert raw material utilization at the site. Identification of lithic raw materials utilized at a site and comparison with geological outcrops of these materials facilitate assessment of the direction and intensity of group movements and/or social contacts between geographically segregated groups. In addition, chert raw material information can be used to reveal patterns of differential use of certain raw materials for particular artifact types.

The first part of this chapter presents a description of the lithic artifacts recovered from the Strong site. This is followed by a discussion of lithic reduction strategies represented at the site as inferred from the lithic tools and debitage recovered. Next is a summary of the chert raw materials represented at the site. Finally, the 11MO841 lithic assemblage is compared to two other excavated Middle Archaic sites in southern Illinois. Such a comparative framework serves two purposes. First it emphasizes the unique aspects of the Strong site, and second, it permits the recognition of additional types and ranges of activities represented which may have occurred at the site.

Lithic Assemblage

The lithic assemblage consists of chert chipped-stone tools and manufacturing debris, cobble and ground-stone tools, and a variety of materials including limestone, fire-cracked rock, hematite, and "Missouri clinkers." The following discussion deals with artifacts derived from feature contexts only, with the exception of the diagnostic projectile point assemblage. Analysis of points recovered from both features and nonfeature subsurface contexts was undertaken. This amounts to a total of 13,929 lithic artifacts, or 83 percent of all stone artifacts recovered during Phase III investigations at the Strong site. The remaining 2,911 stone artifacts were derived from nonfeature contexts during machine scraping of the plow zone. These areas consist of Test Unit 1 and Excavation Blocks I, II, III, and IV. Given the uncertain depositional context of this material, it is not included in the detailed artifact analysis but is presented in tabular form in Appendix B.

Chipped Stone

The chipped-stone assemblage from the Strong site consists of both formally shaped tools and lithic chipping debris. (Appendix B). Formal, retouched tool types are relatively uncommon at the site and are dominated by bifacial artifacts such as projectile points. The bulk of the lithic material consists of waste debris produced by the manufacture of tools and flakes. Unmodified chert debris, such as flakes and blades, possesses edges that can be utilized with little or no modification. Lithic assemblages based on the use of such minimally modified artifacts are referred to as "expedient technologies" and may reflect easy access to an abundant source of lithic raw material (Koldehoff 1987; Parry and Kelly 1987). As will be discussed below, the 11MO841 assemblage appears to be an example of an expedient lithic technology.

Projectile Points. Seventeen projectile points and point fragments were recovered during the Phase III excavations at the Strong site (Table 5-1). Of these, ten were recovered from feature contexts while the rest were piece plots recovered between features during machine scraping of the plow zone. The projectile point assemblage consists of eight base fragments, five stem/midsection fragments, two points with broken distal tips, and two complete points.

The most common type (n=10) is a large corner-notched/expanding stem variety that is represented by six basal and four stem/midsection fragments (Plate 5-1). It is a broad-bladed type with a biconvex cross section. Bases are finely worked with moderate to heavy grinding that extends up the lateral edges of the stem into the notches. Basal shape ranges from straight to slightly concave or convex. Total length of this type is unknown because the two largest examples are broken across the blade. Measurements of the two most intact examples are presented in Table 5-2. These points are typologically somewhat similar to those in the Hardin Barbed and the Kirk Corner Notched clusters (Justice 1987:51, 71). The base morphology of the Strong site examples is generally similar to Hardin Barbed types, although the latter tend to be longer than the former (Justice 1987:243). Notches on the Valmeyer examples are wider than those on the Hardin examples. Although Hardin Barbed types date to between 10,000 and 7500 B.P. in the Midwest, it has been argued that elsewhere they persisted until 6000 B.P. in the form of morphologically similar Scottsbluff II types (Justice 1987:53; Luchterhand 1970:9; Wormington 1957:119, 267). Although morphologically similar, the Scottsbluff II type is much smaller than the 11MO841 examples (Barbour 1932).

These 11MO841 points are also reminiscent of the large variety of Kirk Corner Notched points of the Kirk Corner Notched Cluster (Justice 1987:71). They differ, however, in certain respects. First, the 11MO841 examples exhibit moderate to heavy grinding along the bottom and lateral edges of the base, a feature not characteristic of Kirk Corner Notched types, although this trait appears to be more variable than is often claimed (Broyles 1971:65; Justice 1987:78). Second, although the Strong site points fall within the size range of Kirk Corner Notched Cluster, they are larger than average for the group (Broyles 1971:65; Justice 1987:245). Third, the intact blade morphology on the 11MO841 points suggests they were neither as triangular in shape nor as heavily serrated as Kirk Corner Notched types (Broyles 1971:65; Justice 1987:245). Finally, alternate beveling of blades, a common feature on Kirk Corner Notched points, is not present on the Strong Site points. Chronologically, Kirk Corner Notched types are assigned to the Early Archaic period, 7500 to 6900 B.C., although more recent dates of 5570 to 5100 B.C. have been obtained (Justice 1987:71) that would place them in the early Middle Archaic period.

Another similar large corner-notched type, the Cypress Creek I, has been recovered at the Eva site in Tennessee (Lewis and Lewis 1961:37). Cypress Creek I points exhibit more pronounced tangs, deeper notches, and shorter stems than the Strong site examples. Although these points have been relegated to the Early Archaic Thebes Cluster by Justice (1987:71), the examples illustrated in Lewis and Lewis (1961:Plate 9) bear little resemblance to

Table 5-1. Attributes of Projectile Points from 11MO841.

Provenience	L	W	Th	Wt	Type	Raw Material	Condition
Piece Plot 1	—	36.0	10.0	13.7	Saratoga Expanding Stemmed	Burlington	stem/midsection
Piece Plot 3	—	30.0	7.0	4.8	Ledbetter Cluster	Burlington	base fragment
Piece Plot 6	55.5	32.0	8.0	15.5	Saratoga Expanding Stemmed	Burlington	distal tip broken
Piece Plot 7	35.0	21.0	8.0	7.0	Ferry Expanding Stem	Burlington	distal tip broken
Piece Plot 8	58.5	32.0	8.5	18.1	Shouldered Karnak	Burlington	complete
Piece Plot 10	50.0	33.0	7.7	13.7	Valmeyer Corner Notched	Burlington	stem/midsection
Feature 5	—	—	—	2.2	Valmeyer Corner Notched	Burlington	base fragment
Feature 16	—	40.7	10.0	21.5	Valmeyer Corner Notched	Burlington	stem/midsection
Feature 28	—	—	—	4.9	Valmeyer Corner Notched	Burlington	base fragment
Feature 31	25.0	18.5	3.0	1.3	Flake Point	Burlington	complete
Feature 39	—	—	—	2.4	Valmeyer Corner Notched	Burlington	base fragment
Feature 45	—	—	—	1.2	Valmeyer Corner Notched	Salem	base fragment
Feature 45	—	—	—	1.3	Robinson	Kaolin	base fragment
Feature 45	—	—	—	4.5	Valmeyer Corner Notched	Burlington	base fragment
Feature 47	—	—	—	7.4	Valmeyer Corner Notched	Burlington	stem/midsection
Feature 63	—	43.0	8.5	19.0	Valmeyer Corner Notched	Burlington	stem/midsection
EB IV	—	—	—	2.7	Valmeyer Corner Notched	Burlington	base fragment

Key: L=length, W=width, Th=thickness, Wt=weight, EB=excavation block.
Note: Weights are given in grams; all other measurements are in mm.

other types in this group. Further, Cypress Creek I points were recovered from Stratum IV Bottom at the Eva site, which has been radiocarbon dated to 5200 ± 500 B.C. and is correlated with the early Middle Archaic period (Lewis and Lewis 1961:173).

In general, corner-notched points become increasingly common during the Archaic period (Fowler 1957a). More specifically, these types become increasingly common during the Middle Archaic. At Modoc Rock Shelter, corner-notched and expanding-stemmed points appeared at about 8000 B.P., increased gradually until about 6500 B.P., then decreased until about 6000 B.P. After this date, these types increased again, reaching a peak between 4500 and 5000 B.P. (Fowler 1959:Figure 14). More recent findings at Modoc indicate that types similar to the 11MO841 specimens are present in the Middle Archaic Strata 7–10MT, radiocarbon dated to 7800 to 6800 B.P. (Steven Ahler, personal communication 1996).

To summarize, although the large corner-notched/expanding-stemmed points from 11MO841 share similarities with several other Archaic point types, especially Hardin Barbed and Kirk Corner Notched types, they also exhibit a suite of unique features such as moderately to heavily ground bases, wide notches, and short stems, suggesting that they are a unique, previously undefined Middle Archaic type. The general overall appearance of the points suggests affinities with both the Kirk Corner Notched and Hardin Barbed clusters. While these are generally accepted as Early Archaic types, there

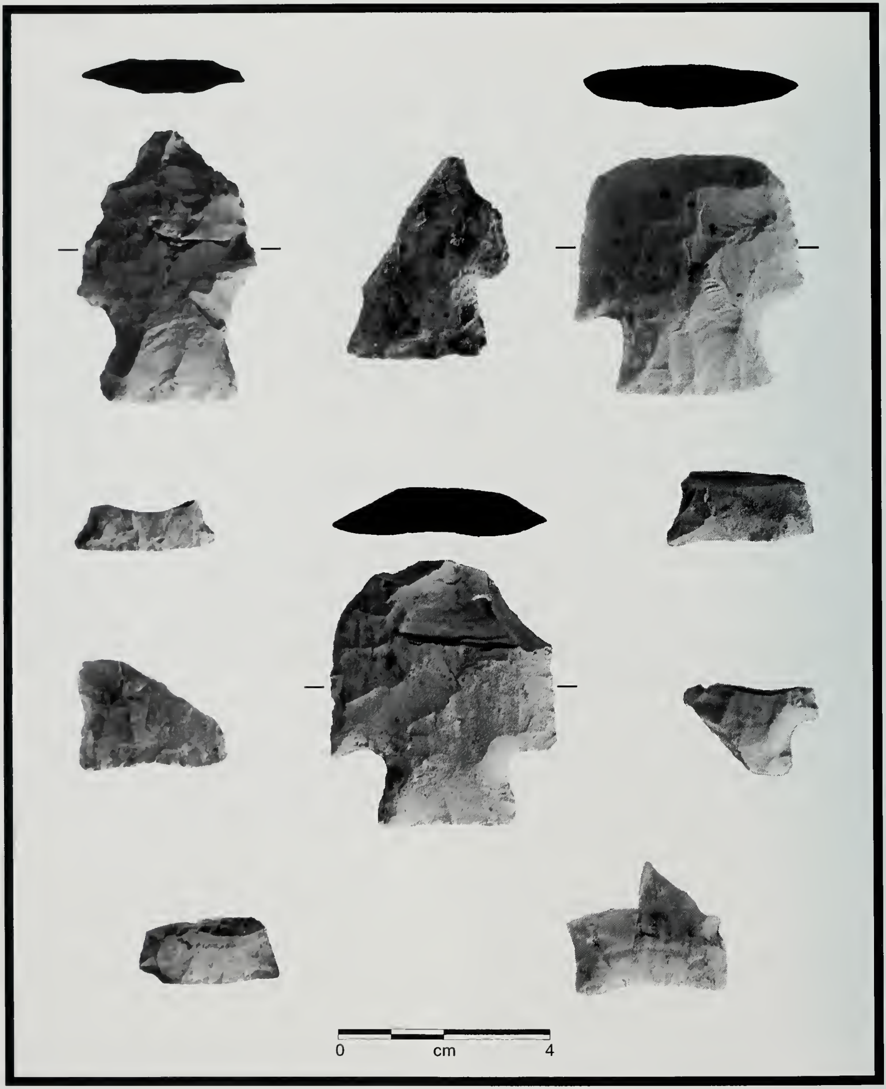

Plate 5-1. Valmeyer Corner Notched Projectile Points.

Table 5-2. Measurements of Valmeyer Corner Notched, Hardin Barbed, and Kirk Corner Notched Points.

	Valmeyer Corner Notched		Hardin Barbed[a]		Kirk Corner Notched[a]	
Attribute	Range	Mean	Range	Mean	Range	Mean
Width[b]	40.0–43.0	41.8	28.0–44.0	36.0	20.0–45.0	30.0
Thickness[c]	7.7–10.0	9.2	7.0–11.0	8.5	6.0–12.0	8.0
Stem length[d]	12.5–14.8	13.6	13.0–24.0	17.5	—	—
Stem width (max.)[e]	25.4–29.6	26.9	20.0–30.0	26.0	—	—
Stem width (min.)[f]	20.4–25.5	22.0	—	—	—	—
Stem thickness[g]	5.2–7.0	6.2	—	—	—	—
Notch width[b]	13.5–14.3	13.9	—	—	—	—
Notch depth[b]	6.9–7.6	7.2	—	—	—	—

Note: All measurements are in mm.

[a] From Justice (1987).

[b] Based on two measurements.

[c] Based on three measurements.

[d] Based on four measurements.

[e] Based on nine measurements.

[f] Based on six measurements.

[g] Based on seven measurements.

appears to be a high degree of morphological variability within the corner-notched/expanding-stem groups, and temporal evidence indicates that such types are not uncommon during the Middle Archaic period. It is suggested here that the large corner-notched/expanding-stem points from 11MO841 be recognized as a new Middle Archaic type termed Valmeyer Corner Notched. Measurements for this type compared to Hardin Barbed and Kirk Corner Notched types are presented in Table 5-2. Three examples of this type were found in feature contexts at 11MO841 which have produced radiocarbon dates of 6870 ± 80 B.P. and 6780 ± 70 B.P.

Four other points from the Strong site are classed here as Middle Archaic types (Plate 5-2). One nearly complete point (Piece Plot 7) (Plate 5-2, a) resembles the Ferry Expanding Stemmed type as illustrated in Lopinot (1991:153). These types dominate the point assemblage at the Ferry site in southeast Illinois (Fowler 1957b). Although this site dates to the Late Archaic, Lopinot (1991:159) associates Ferry points with the late Middle Archaic of the Diana site in northern Randolph County, Illinois. One base fragment, recovered from Feature 45 and associated with a radiocarbon date of 6780 ±70 B.P. (Plate 5-2, b), has been classed as a possible Robinson point, a morphological correlate of the Raddatz Side Notched. This type also is recorded at the Middle Archaic Nochta site in the American Bottom (Higgins 1990). A minimally worked flake point from Feature 31 (Plate 5-2, c) resembles similar types recovered from Middle Archaic deposits (Strata 3MT-11E) at Modoc Rock Shelter (Steven Ahler, personal communication, 1996). Finally, a single Shouldered Karnak, a Middle Archaic type recognized at Carrier Mills in southwestern Saline County, Illinois (May 1982:1362), also was found at 11MO841 (Piece Plot 8) (Plate 5-2, d). While Karnak points have been assigned to the Late Archaic Stemmed Cluster by Justice (1987:133), the shouldered variety has been recovered from dated Middle Archaic contexts at the Black Earth site (May 1982:1362).

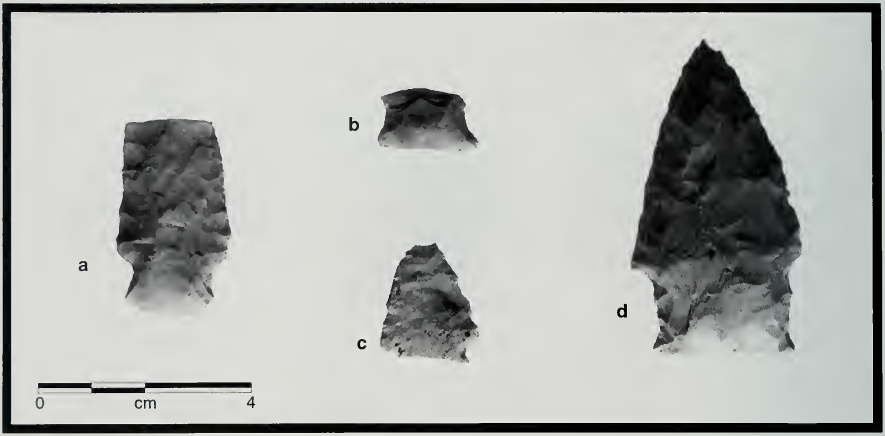

Plate 5-2. Middle Archaic Projectile Points: a, Ferry Expanding Stemmed; b, Robinson; c, Flake; d, Shouldered Karnak.

The remaining three projectile points are classified as Late Archaic types, none of which is from a feature. Two examples (Piece Plots 1 and 6) are classed as Saratoga Expanding Stemmed points (Plate 5-3, a, b) while the remaining one (Piece Plot 3) falls within the Ledbetter Cluster (Plate 5-3, c). These point types may indicate an ephemeral Late Archaic occupation of the site.

Other Chert Tools. Formal retouched tools are relatively rare from feature contexts at 11MO841 (Table 5-3) (Figure 5-1). Lithic material found during surface stripping of excavation blocks is of uncertain context and is tabulated in Appendix B. Bifaces and biface fragments, which represent later-stage reduction activities, make up the largest category of retouched artifacts at the site (n=36). Thin bifaces are the most common type, accounting for approximately 66 percent of all bifaces, followed by rough (19 percent) and thick (14 percent) types. This distribution may indicate that little early-stage biface production occurred at the Strong site and that one activity may have been the final thinning of bifaces which had been roughed out at other locations, possibly at the actual chert outcrops in the nearby bluffs. Alternatively, bifaces roughed out on-site may have been taken elsewhere for final working. Feature 39 is interesting in this respect since approximately 30 percent (n=46) of all bifacial thinning flakes were found there, suggesting that biface production or maintenance was more common here than elsewhere and that this activity may have been conducted at highly localized places on site.

Other lithic tools consist of twelve chert hammerstones (Plate 5-4), six perforators (Plate 5-5), four retouched flakes, one retouched blade (Plate 5-6, a), one end scraper (Plate 5-6, b), one bifacially worked scraper, and one wedge (Plate 5-6, c) (Figure 5-1). Chert hammerstones are common in Archaic assemblages such as the Late Archaic collections from the Koster site (Cook 1976). The abundance of chert hammerstones at 11MO841 is

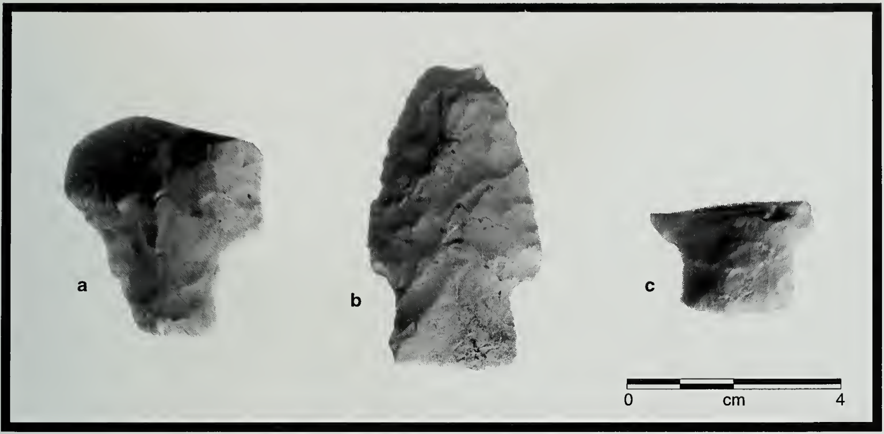

Plate 5-3. Late Archaic Period Projectile Points: a-b, Saratoga Expanding Stemmed; c, Ledbetter Cluster.

most likely due to the proximity of rich chert outcrops in the nearby bluff face. Finally, 55 utilized flakes were recovered from feature contexts at 11MO841. The paucity of formally retouched tools at this site and the abundance of utilized flakes suggests that an expedient tool kit was a major component of tasks undertaken at this site.

Debitage. A total of 12,491 pieces of lithic debitage was recovered from feature contexts at 11MO841 (Table 5-4). Of this, 5,985 pieces (48 percent) consist of block shatter, indicating that early-stage lithic reduction was a common activity at this site (Figure 5-2). The amount of shatter at the Strong site is similar to that recovered from the Nochta site (40 percent of all debitage) where it is likewise interpreted as evidence of initial stages of lithic reduction and a bipolar reduction strategy (Higgins 1990:88). As is discussed in more detail below, bipolar cores were the second most common core type at 11MO841 (33.5 percent of all cores), although bipolar flakes (n=153) represent only a small proportion of all debitage (1.2 percent). The co-occurrence of these types and the abundance of block shatter suggests that bipolar reduction was a relatively common activity at the Strong site. Further, it has been determined (Jeske and Lurie 1993) that in situations where both bipolar and free-hand reduction strategies have been employed, it is not possible to completely segregate debitage produced by these reduction strategies. As a result, it is likely that bipolar debris will be underrepresented in the debitage assemblage. After shatter, the next most common category of debitage is broken flakes (25.9 percent), followed by tertiary flakes (13.9 percent), secondary flakes (5.5 percent), primary flakes (3.4 percent), bifacial thinning flakes (1.2 percent), bipolar flakes (1.2 percent), and blades (.7 percent).

Table 5-3. Chert Tools From 11MO841 Features.

Tool Type	n	%
Thin biface	24	38.7
Chert hammerstone	12	19.3
Rough biface	7	11.2
Perforator	6	9.6
Thick biface	5	8.0
Retouched flake	4	6.4
Retouched blade	1	1.6
End scraper	1	1.6
Wedge	1	1.6
Bifacial scraper	1	1.6
Total	62	99.6

Nonchert Lithic Tools

This class of tools consists of cobble and ground-stone tools. Cobble tools include manos, metates, nonchert hammerstones and pitted cobbles, none of which is common at the site (Table 5-5). Nonchert hammerstones (n=22) represent the largest tool type in this category. This is followed by pitted cobbles (n=3), metate fragments (n=2), and mano fragments (n=1). Six ground-stone tools were recovered from feature contexts at the site (Table 5-5). Three of these are sandstone abraders (Plate 5-7, a). Two ground-stone axes were found at 11MO841. One is a roughed-out, unfinished axe from Feature 74 (Plate 5-7, b), and the other is a fully grooved axe recovered from a feature during Phase II investigations (Volume I, this report; McGowan 1994). The last tool in this category is a roughed out, celt-shaped piece of limestone from Feature 12 which appears to be another unfinished tool (Plate 5-7, c).

Miscellaneous Lithic Material

A variety of nonchert lithic raw materials also was recovered from features at 11MO841. These materials consist of limestone, fire-cracked rock, hematite, peridotite, and “Missouri clinkers,” and are summarized in Table 5-5. The most abundant of these, both by number and weight, is limestone. Only one artifact, the celt from Feature 12 described above, was made from this material, indicating that it generally was not used in tool production. Likely functions of limestone include use as hearth and water-boiling stones. Fire-cracked rock is the second most common material, and, as the term implies, was used for heating purposes (Taggert 1981; Zurel 1981). Hematite is present in small amounts and was probably used as a pigment.

An unusual artifact from Feature 50 is a large (approximately 4.0 kg) peridotite cobble with black augite crystals (Richard Harvey, personal communication 1995). This material occurs as igneous intrusions, the closest sources of which are in southeast Illinois in Hardin and Pope counties, approximately 200 km southeast of Valmeyer (Bradbury 1962; Clegg 1955; Clegg and Bradbury 1956). The function of this artifact could not be determined as there was no evidence of use in the form of battering, crushing, or grinding.

Finally, four pieces of “pumice-like” stone were recovered from Features 39, 55, 70, and 74 (Plate 5-8). Such stones are known as “Missouri River clinkers” and are derived from “clinker beds” in the Great Plains (Wayne et al. 1991). These clinkers are thermally metamorphosed rock produced by the natural burning of subbituminous coal beds. The Powder River Basin in Montana and Wyoming is particularly rich in these stones, which are eroded and transported down the Missouri River to the Mississippi River Valley. Clinkers have a coarse texture and would have been useful as abrading stones, although no obvious evidence of such utilization was observed on the pieces found at the Strong site.

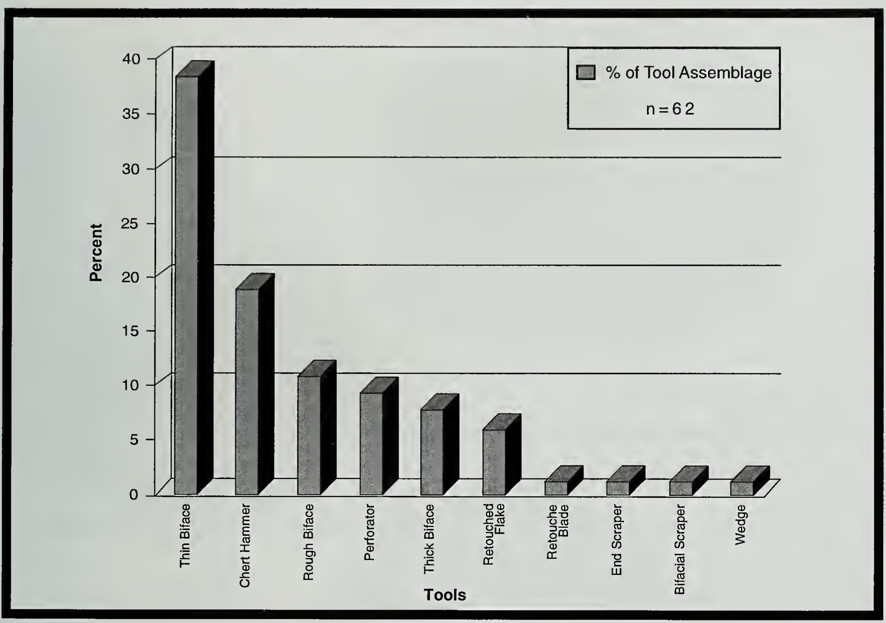

Figure 5-1. Frequency of Chert Tools in the Strong Site Lithic Assemblage.

Lithic-Reduction Strategies

Cores recovered from the Strong site permit some conclusions regarding lithic-reduction strategies at the site. A total of 218 cores was recovered from feature contexts at the site (Plate 5-9). As Table 5-6 indicates, multidirectional cores are the most common type at the site, accounting for nearly 60 percent of all cores. This is followed by bipolar (33 percent) and planoconvex (5.5 percent) types. A small proportion (1.8 percent) of cores consists of exhausted fragments which could not be assigned to a particular type. The dominance of multidirectional and bipolar cores suggests that an expedient lithic-reduction strategy was practiced at the site (Koldehoff 1987; Parry and Kelly 1987). The scarcity of more carefully prepared planoconvex cores indicates that little effort was invested in core preparation. Rather, it appears that most cores were flaked in an unpatterned, random fashion. As these cores became smaller and more difficult to flake by hand, the knappers would have shifted to a bipolar strategy in which the reduced core was rested on an anvil and further reduced by simple pounding and smashing, producing the battered and crushed examples from the site (Koldehoff 1987:167). As discussed above, the large amount of block shatter among the debitage also suggests that bipolar reduction was a significant aspect of the lithic-reduction strategy. Approximately 57 percent of the bipolar cores in the analyzed sample are made from Fern Glen chert. This raw material is of somewhat

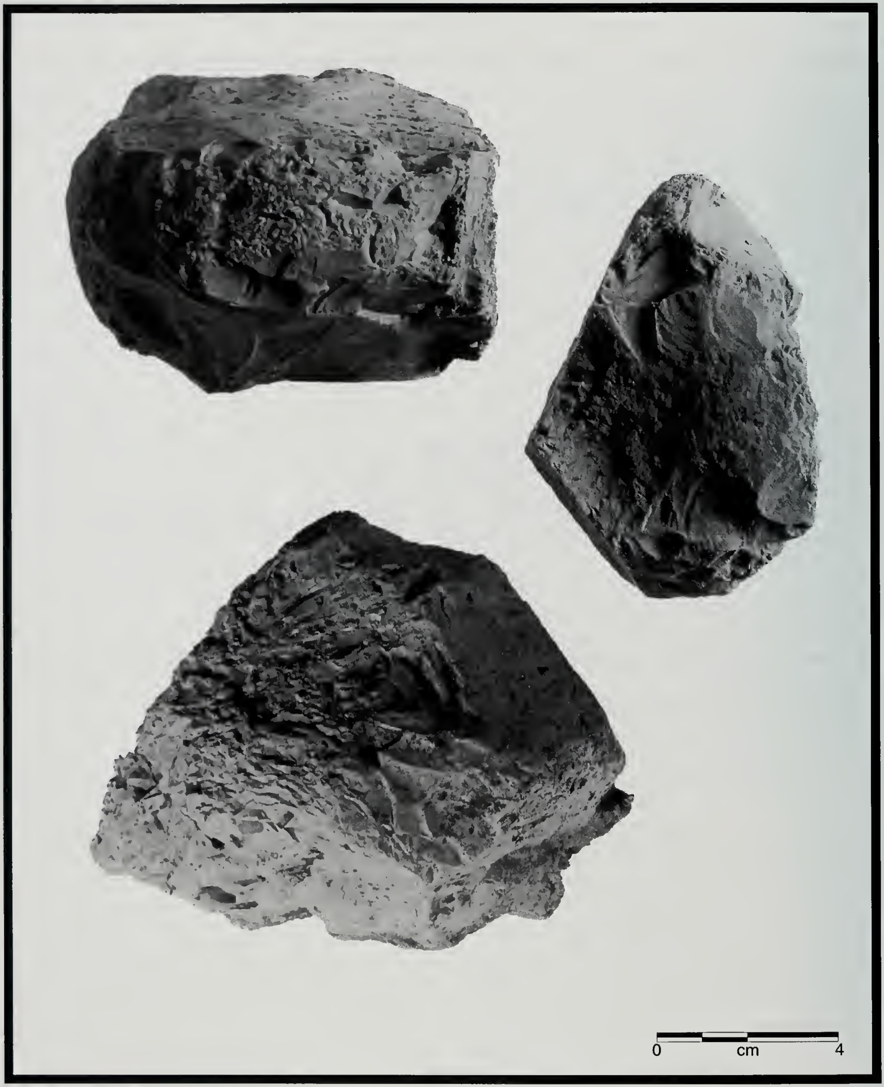

Plate 5-4. Chert Hammerstones.

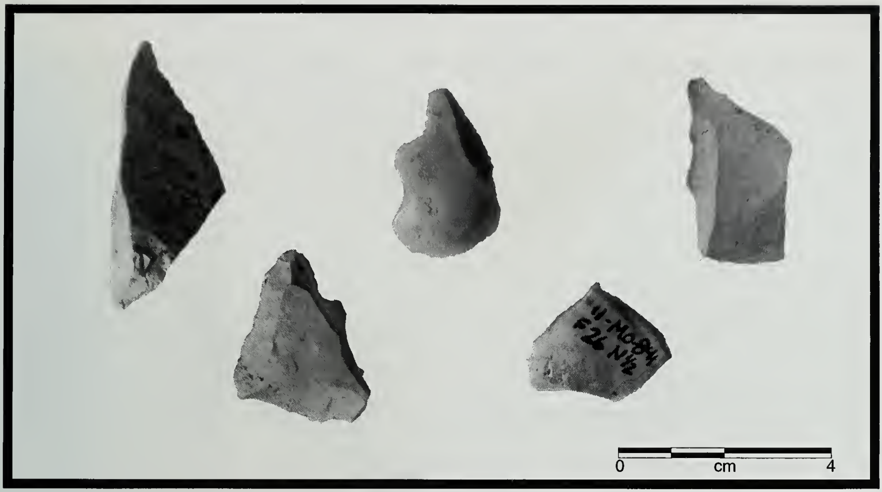

Plate 5-5. Perforating Tools.

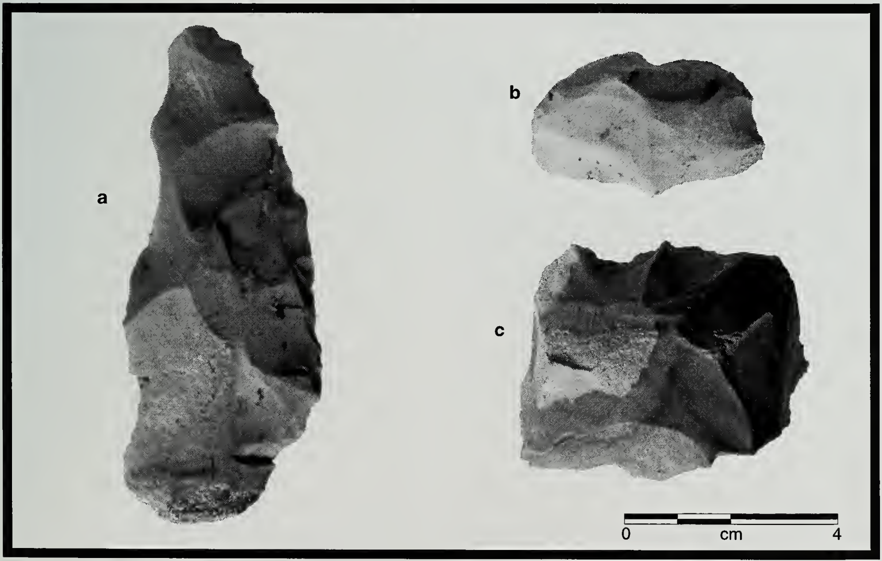

Plate 5-6. Miscellaneous Chert Tools: a, Retouched Blade; b, End Scraper; c, Wedge.

Table 5-4. Lithic Debitage from 11MO841 Features.

Debitage Type	n	%
Block shatter	5,985	47.9
Broken flake	3.233	25.8
Tertiary flake	1,742	13.9
Secondary flake	694	5.5
Primary flake	428	3.4
Bifacial thinning flake	160	1.2
Bipolar flake	153	1.2
Blade	96	.7
Total	12,491	99.6

higher quality than the grainier Salem chert, which may explain why it was more intensively reduced using the bipolar technique. The practice of an expedient reduction strategy also is supported by the paucity of formally retouched tools and the abundance of utilized debitage as mentioned above.

Expedient lithic-reduction strategies are considered highly wasteful of raw material, and the use of such strategies has been correlated with increased sedentism (Koldehoff 1987:175; Parry and Kelly 1986:303). While the degree of sedentism of the occupants of 11MO841 cannot be inferred based on the available data, it is possible that the expedient approach to lithic reduction and tool use at the site is in part due to an extended period of occupation. A more significant factor, however, was probably the rich source of lithic raw material on hand near the site in the Valmeyer Anticline. The abundance of chert here resulted in minimal time and labor investment in core preparation and tool manufacture (Parry and Kelly 1987). The bipolar technique was employed by the Middle Archaic inhabitants of the Koster site in the lower Illinois River valley, where it may be correlated with a logistical mobility system (Jeske and Lurie 1993). Significantly, chert raw material is locally abundant at both the Koster and Strong sites.

The abundance of nondiagnostic bifaces suggests that the production of this artifact type was an important activity at the Strong site, possibly as part of a projectile point production trajectory. The relative abundance of thin bifaces was noted above in the discussion of retouched tools, and it was suggested that this pattern might reflect either the lack of early biface manufacture on the site or the removal of early-stage bifaces (rough and thick bifaces) from the site for completion at a different location. The suggestion that early-stage biface production is absent from the site is contradicted by the discussion of debitage presented above, which revealed that entire reduction sequences are represented. However, it is possible that debris classified as resulting from early reduction may not have been part of a biface production trajectory. The relative paucity of early-stage bifaces may simply reflect the successful production of thin bifaces, the ultimate goal of the manufacturing process (Jefferies 1982b:111).

The pattern of raw material utilization as represented among core types deviates from the pattern observed for the lithic assemblage as a whole (Table 5-7). While Salem chert is the most commonly utilized type, it is followed by Fern Glen and then Burlington, just the reverse of the general pattern of raw material representation at the site. While this may simply reflect a sampling bias, it is possible that reduction strategies varied by raw materials. From the analyzed sample, 50 percent of the cores made from Burlington chert are the more carefully prepared planoconvex types. As was discussed above, Burlington chert was also the preferred raw material for the production of projectile points. Projectile point production is a time and labor intensive activity, and carefully produced flake blanks would have been necessary to insure successful manufacture. As formally retouched tools are relatively uncommon in the 11MO841 assemblage,and are almost exclusively represented by projectile points, prepared cores for the manufacture of these tools should be relatively uncommon. It is suggested here that carefully produced planoconvex

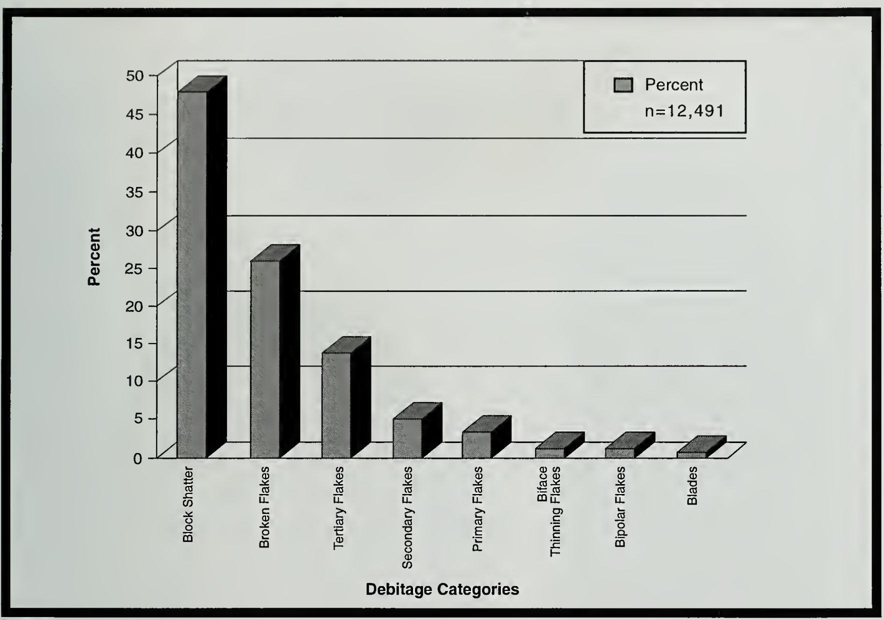

Figure 5-2. Frequency of Debitage Categories in the Strong Site Lithic Assemblage.

cores, nearly half of which were made from Burlington chert, were a part of the projectile point production trajectory and are thus less common in the core assemblage. This in turn accounts for the decreased representation of Burlington chert in the core subsample. Lopinot (1991:160) notes that hafted bifaces at the late Middle Archaic Diana site in Randolph County, Illinois, are primarily made from Burlington chert, which does not outcrop in the site area. Further, he notes (Lopinot 1991:188) that Burlington chert arrived at this site primarily as preforms/blanks or finished tools, most likely from sources to the west. The production of such blanks, therefore, may have been a specialized activity at sites such as 11MO841 which were close to outcrops of Burlington chert. It is interesting to note that, as is discussed below, the few nonlocal lithics recovered from the Strong site indicate contacts with southern and southeastern Illinois, suggesting that lithics and other materials may have been transported between this area and the American Bottom region during the Middle Archaic period.

Raw Material Utilization

Chert raw material types were determined for a sample of twelve features from 11MO841. This sample represents those features which were dated either by association with diagnostic artifacts and/or

Table 5-5. Cobble Tools, Ground-Stone Tools, and Miscellaneous Material from 11MO841 Features.

Tool Type	No. of Features from Which Recovered	n (tools)	Weight (g)
Cobble Tools			
Hammerstone	15	22	7,406.8
Pitted cobble	3	3	1,080.6
Metate fragment	2	2	926.4
Mano fragment	1	1	312.0
Ground-Stone Tools			
Sandstone abrader	3	3	184.3
Axe	2	2	1,548.5
Limestone celt	1	1	399.0
Miscellaneous Material			
Limestone	59	1,236	6,925.1
Fire-cracked rock	35	127	2,581.6
Hematite	13	19	15.9
Missouri clinker	4	4	88.6
Peridotite	1	1	3,090.9

radiocarbon dates. The single exception is feature 18, which produced a projectile point fragment that was subsequently determined to be too fragmentary for stylistic and temporal determination. The analyzed sample consists of 3,693 chert artifacts, of which 726 (20 percent) could not be confidently identified as to raw material.

Cryptocrystalline raw materials utilized at 11MO841 were available locally in the Valmeyer Anticline in Dennis Hollow and adjacent bluffs, and it appears that these were the primary sources utilized (Figure 5-3; Appendix C). Definitions of the various raw material types are provided in Volume I, Chapter 4 of this report. Nonlocal raw materials present include Kincaid, Kaolin, and Mill Creek cherts. As Table 5-8 shows, over one-half of the analyzed sample, both by count and weight, consists of Salem and Burlington cherts (Figure 5-4). Together these two raw materials account for 90 percent of the utilized raw materials. Burlington chert appears to have been preferred for projectile point production, accounting for about 82 percent of these artifacts (Figure 5-5). Both chert types are available in the Valmeyer Anticline and were equally available to the prehistoric inhabitants of the site. The dominance of Salem chert may be due to the fact that it occurs higher in the geological sequence and may have been more accessible and easier to secure from the bluff top.

In addition to projectile points, Burlington chert also was preferred for other formal tools. Of 22 formal tool types which were included in the analyzed sample of features, 12 (54.5 percent) were made from Burlington chert, four (18 percent) from Salem chert, four from unidentifiable burnt chert, one (4.5 percent) from St. Louis chert, and one from Fern Glen chert.

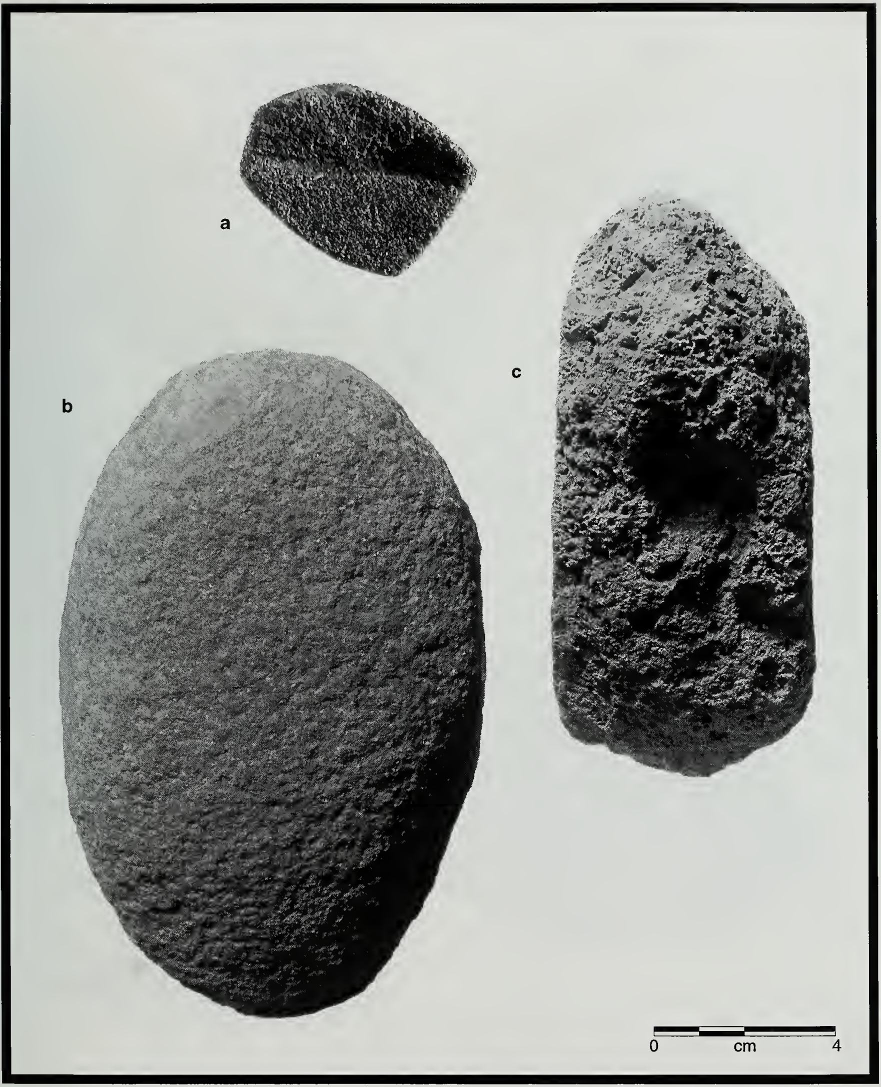

Plate 5-7. Nonchert Lithic Artifacts: a, Sandstone Abrader; b, Axe Preform; c, Limestone Celt Preform.

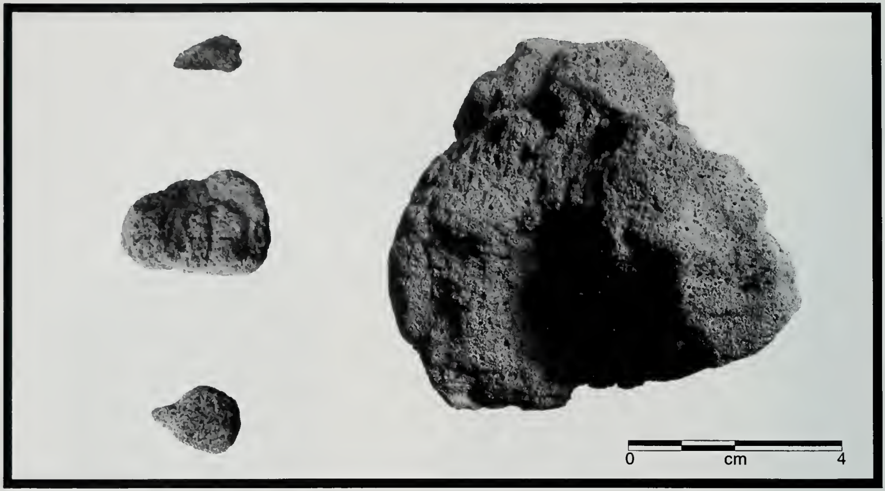

Plate 5-8. Missouri Clinkers.

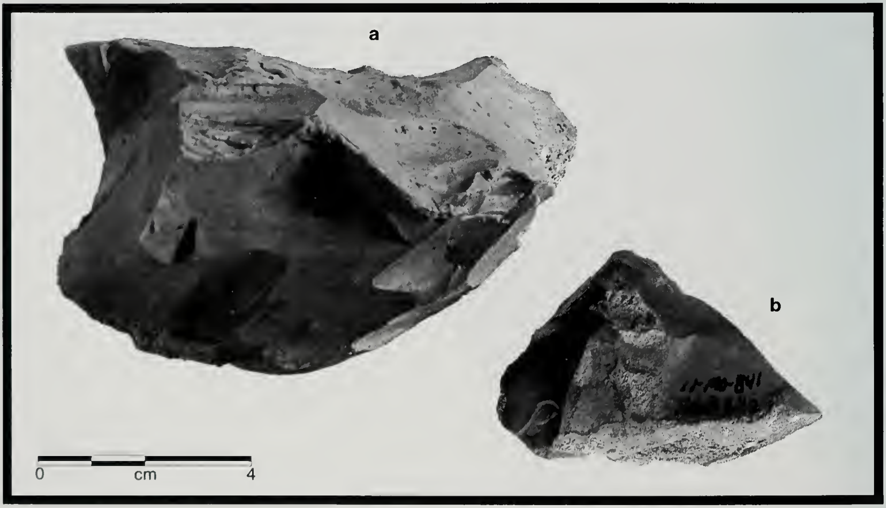

Plate 5-9. Plano-Convex Core (a) and Bipolar Core (b).

Table 5-6. Core Types Recovered from Features.

Core Type	n	%
Multidirectional	127	58.2
Bipolar	73	33.5
Planoconvex	12	5.5
Other	6	1.8
Total	218	99.0

Nonlocal raw materials represent a minor component of the lithic raw material assemblage. Kincaid, Kaolin, and Mill Creek cherts were derived from sources located between approximately 100 and 150 km southeast of Valmeyer and account for 1.6 percent of the analyzed sample (.14 percent by weight). Only one projectile point fragment, a possible Robinson/Raddatz base fragment, was made from one of these raw materials. These data, together with the presence of the peridotite cobble discussed above, suggest that there were at least some long distance movements/interactions with groups located a considerable distance southeast of the site.

Interassemblage Comparisons

Having presented a discussion of the various tool and debitage types found at the Strong site and an outline of the lithic-reduction strategies utilized at the site, it is now possible to compare 11MO841 with other Middle Archaic sites in the region and to speculate on the types of activities which were performed at the site. Detailed descriptions of excavated Middle Archaic sites are not common for this region due to the general lack of well-preserved sites from this period that have been formally investigated. Two sites, Nochta in the American Bottom (Higgins1990) and the Black Earth site in southeast Illinois (Jefferies and Butler 1982), have produced intact Middle Archaic features and midden deposits and will be the primary sources of comparison for the following discussion. In addition, these sites represent different components of Middle Archaic subsistence-settlement systems, the Nochta site a repeatedly occupied seasonal field camp and the Black Earth site a year-round occupation (Jefferies 1982a:1506), and can thus provide models of lithic assemblages and reduction strategies characteristic of such site types.

Artifact Assemblages

The Nochta site is located approximately 40 km to the north of 11MO841 on a sand ridge in the Mississippi River floodplain (Higgins 1990). The exact size of the lithic artifact assemblage from the Nochta site is not given by Higgins (1990), but it is stated that material from 39 features (17.7 percent of all features) had been analyzed. Thus, discussion of the Nochta site is limited to a sample of the entire Middle Archaic assemblage.

Like the Strong site, Nochta produced a relatively small (n=318), nondescript lithic tool assemblage. A total of 55 retouched tools have been identified at this site, the most common of which are projectile points (n=37), followed by *pièces ésquillées* (n=13), bifaces (n=3), and perforators (n=2). As at 11MO841, utilized flakes are more abundant than any class of formally retouched tools (n=45) at the Nochta site.

The nonchert stone tool assemblage from the Nochta site is likewise meager (n=9) and is again reminiscent of the Strong site assemblage. It consists of two large metates, three manos, one cobble chopping tool, one fully grooved axe, one axe bit fragment, and one piece of ground hematite.

At the Black Earth site in Saline County, Illinois, Zone 3 of Area A produced a large Middle Archaic lithic assemblage of approximately 1,100 retouched lithic artifacts (Jefferies 1982a:1467). The assemblage is dominated by bifaces and scrapers, which make up 90 percent of the retouched tool inventory. Of this, bifaces account for 61.4 percent of all

Table 5-7. Raw Material and Cores Types at 11MO841.

	Multidirectional Core		Bipolar Core		Planoconvex Core	
	n	%	n	%	n	%
Salem	5	55.5	2	28.5	2	40
Fern Glen	2	22.2	4	57.1	1	20
Burlington	1	11.1	1	14.2	2	40
St. Louis	1	11.1	0	<1.0	0	0
Total	9	99.9	7	99.8	5	100

retouched tools while 33.5 percent of the assemblage is composed of a combination of end scrapers and side scrapers. Of the scrapers, 71 percent are represented by hafted examples made from broken projectile points (Jefferies 1990). The remaining ten percent of the tool assemblage is composed of denticulates, notches, gravers, drills, and perforators. This site differs from the 11MO841 assemblage in terms of the number of retouched artifacts and the high proportion of scraping tools. In addition to the retouched tool assemblage, the Black Earth site produced a large ground-stone tool assemblage (n=192), consisting of 60 grinding stones, 45 pitted stones, 37 grooved abraders, 23 hammerstones, 10 grinding slabs, eight grooved axes, six atlatl weights, and three ground-stone bits.

Comparison of the Strong site assemblage with those from Nochta and Black Earth indicates that the former is unique in many respects. At 11MO841, 15 tool types were recovered (bifaces, hammerstones, perforators, retouched flakes, retouched blades, end scrapers, wedges, bifacial scrapers, utilized flakes, pitted cobbles, axes, abraders, celts, manos, and metates) while at the Nochta site, seven classes of tools are represented (bifaces, *pièces ésquillées*, perforators, utilized flakes, metates, manos, and axes). Assuming that the number of tool types provides an approximate estimate of the number of activities represented at a site (Jefferies 1982b:114), the more diverse tool kit at 11MO841 suggests that a wider range of activities were performed here than at Nochta. The general scarcity of retouched tools at 11MO841 is similar to the situation at Nochta. However, 11MO841 differs from Nochta in its relative abundance of bifaces (other than projectile points), hammerstones, and perforators. *Pièce ésquillée* is the second most abundant tool type at Nochta while only one such tool, described as a wedge, was found at Strong. As will be discussed below, the abundance of hammerstones and nondiagnostic bifaces together with partially finished ground-stone tools at Strong suggests that tool production was an important activity at this site. The paucity of such artifacts at Nochta suggests that the production of retouched and ground-stone tools was not an important activity. The function of the *pièce ésquillée* tools at Nochta has not been determined, but it has been proposed that such artifacts were used to produce bone, wood, or antler splinters from which other tools were made (Higgins 1990:88). At both the Strong and Nochta sites, utilized flakes occur in similar proportions. When combined with the intentionally retouched tool assemblage, utilized pieces represent 47 percent of the Nochta tool kit and 45 percent of the 11MO841 tool kit. Expedient tools such as utilized flakes may relate to the abundance of lithic raw materials in the immediate vicinity of Strong. Although Nochta is located in the Mississippi River floodplain and is not in the immediate vicinity of chert resources, lithic materials are widespread throughout the American Bottom and would certainly never have been a scarce resource.

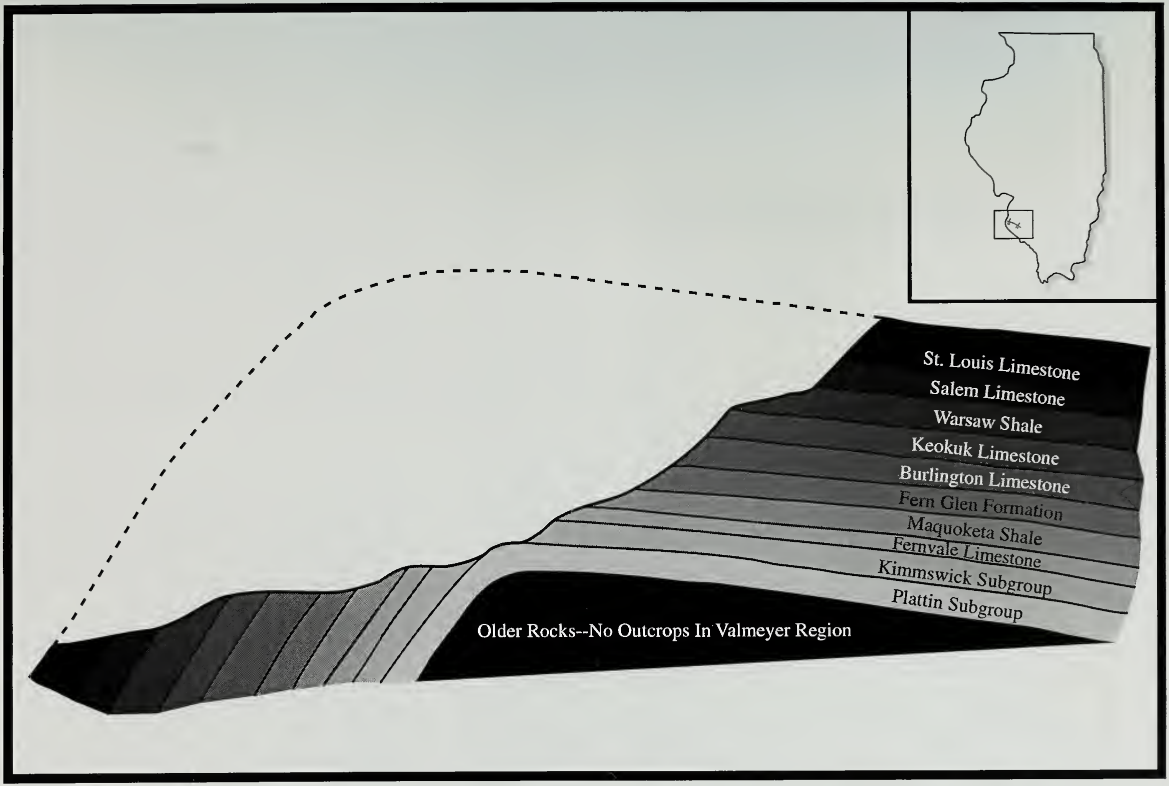

Figure 5-3. Cross Section Through the Valmeyer Anticline (after Odom et al. 1961).

Table 5-8. Chert Types Utilized at 11MO841.

	Total Assemblage				Projectile Points	
Chert Type	n	%	Weight (g)	%	n	%
Salem	1,700	57.3	16,917.1	76.1	1	5.8
Burlington	986	33.2	3,598.5	16.3	14	82.3
Fern Glen	167	5.6	1,206.5	5.4	1	5.8
St. Louis	53	1.7	245.7	1.1	0	.0
Kincaid	42	1.4	33.9	.10	0	.0
St. Genevieve	15	.50	74.2	.30	0	.0
Kaolin	2	.06	1.5	.006	1	5.5
Mill Creek	1	.03	8.6	.04	0	.0
Grover/Lafayette	1	.03	1.6	.007	0	.0
Total	2,967[a]	99.8	2,087.6[a]	99.8	17	99.7

[a] Totals based on a sample of 12 features; unidentifiable chert types (n=726) are not included.

Further, given the seasonal, short-term occupation of Nochta by groups that undoubtedly were highly mobile during certain seasons, it is probable that the site inhabitants had ready access to lithic raw materials and, therefore, did not employ a more conservative lithic tool production system.

At the Black Earth site, 18 tool types have been recognized (bifaces, side scrapers, end scrapers, combination end/side scrapers, combination end/side scrapers, denticulates, notches, gravers, drills, perforators, utilized flakes, axes, ground-stone bits, atlatl components, abraders, hammerstones, grinding slabs, pitted stones, and grinding stones). Again, assuming that the number of tool types provides a rough estimate of the number of tasks performed at a site, a wider range of activities appear to have been performed at the Black Earth site than at the Strong site. Especially striking is the difference between 11MO841 and the Black Earth site in terms of the abundance of scrapers. At the latter, such tools account for approximately one-third of the retouched tool assemblage while at 11MO841 only two scrapers were found, representing 3.2 percent of the retouched chert tool assemblage. A high-power microwear analysis of a sample of the hafted end scrapers from the Black Earth site indicates that these tools were used primarily to curry dry hides, although woodworking also was represented on some tools (Jefferies 1990). When considered as a proportion of the entire chert tool assemblage, utilized flakes represent 35 percent of the tool kit, a figure which is lower than those from 11MO841 and the Nochta site. As expedient technologies and tool kits tend to be wasteful of lithic raw material (Koldehoff 1987:175; Parry and Kelly 1987:303), the pattern at the Black Earth site could reflect the decreased accessibility to lithic raw materials since the closest chert sources are 27 km to the southeast (Jefferies 1990:11). Further, this site has been interpreted as a year-round occupation. Given the sedentary nature of this occupation and the lack of nearby chert resources, it is not surprising that expedient tools are less common than at the American Bottom sites.

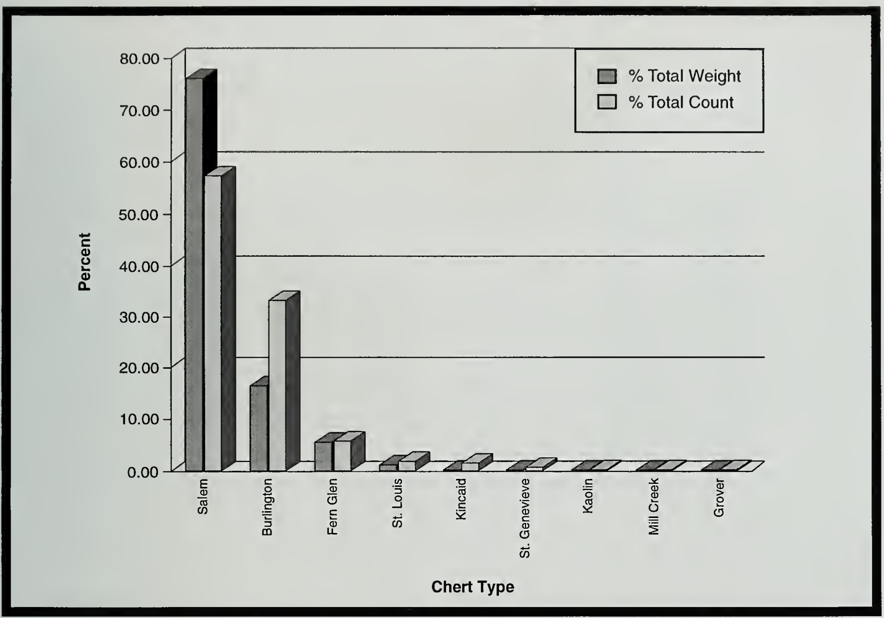

Figure 5-4. Utilization of Various Chert Types in the Strong Site Lithic Assemblage.

Tool Production Trajectories

In order to facilitate the comparison of the Strong and Nochta sites with a documented sedentary residential site, the general biface-production model employed by Morrow (1982) for the analysis of the Black Earth site lithic assemblage is used in this section. As with the Black Earth site, the biface production model is relevant to an understanding of the Strong site assemblage given the predominance of bifaces among the retouched tools. Further, given the lithic classificatory system used at the Nochta site, the model also can be applied to that assemblage. This model recognizes three stages in the production of bifaces. The first stage involves initial chipping and results in the production of cores, block shatter, large flakes, and tool blanks. In the second stage, bifacial thinning is the main activity and results in the production of a finished biface. Stage 2 produces both percussion and bifacial thinning flakes. The final stage involves tool rejuvenation, which produces small resharpening flakes.

Use of this model permits site activities to be inferred through the comparison of artifact type ratios (Morrow 1982). Such comparisons permit conclusions to be drawn regarding stages of lithic-reduction sequences represented on a particular site, which in turn assists in the reconstruction of site activities. Following Morrow (1982), the following ratios will be employed for this purpose: unfinished tools (failed blanks and preforms):finished tools,

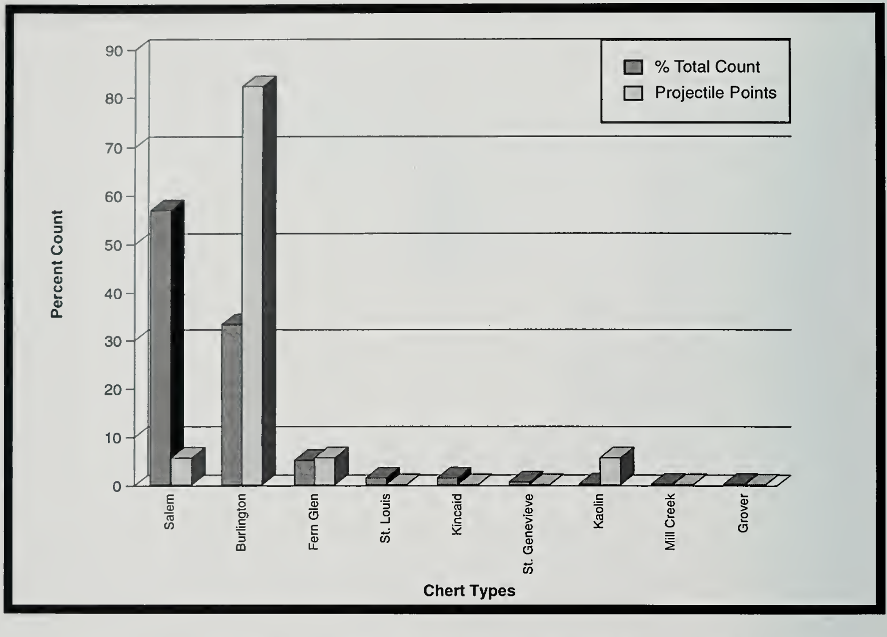

Figure 5-5. Comparison of Chert Raw Materials in the Analyzed Sample and Projectile Point Assemblage.

shatter:flakes, cores:flakes, bifacial thinning flakes: flakes (Table 5-9). The ratio of unfinished tools to finished tools is taken as a measure of on-site tool production. A high proportion of unfinished tools suggests that tool production was an important site activity. The shatter:flake and core:flake ratios provide information on the stage of lithic reduction. High proportions of shatter and cores in the debitage indicate that early-stage lithic reduction occurred at a particular site. The proportion of bifacial thinning flakes to percussion flakes also provides a measure of the stage of reduction represented.

At Strong the ratio of unfinished to finished tools was calculated based on the number of nondiagnostic bifaces (unfinished tools) and projectile points (finished tools). This gives a ratio of 1:0.28, or one unfinished tool for every .28 finished tools, the equivalent of approximately 36 unfinished tools for every 10 finished tools. At Black Earth, a ratio of 1:8.9 unfinished tools to finished tools was derived while at Nochta the ratio is 1:3.6. These figures indicate that unfinished tools are more abundant at Strong than either Black Earth or Nochta and that bifacial tool production was a more common activity at 11MO841 than the other two Middle Archaic sites. Further, Strong also produced an unfinished ground-stone axe, a roughed-out limestone celt, and several hammerstones, which provide additional evidence of the importance of stone-tool production at this site.

Table 5-9. Comparison of Tool and Artifact Ratios from the Strong, Nochta, and Black Earth Sites.

Ratio	Strong	Nochta	Black Earth
Unfinished:finished tools	1:0.28	1:3.60	1:8.9
Shatter:flakes	1:1.08	1:1.02	1:1.6
Cores:flakes	1:29.1	1:18.0	1:237.9
Bifacial thinning flakes:flakes	1:19.4	—	1:4.7

In order to assess the stages of lithic reduction represented at 11MO841, the ratios of shatter to flakes and cores to flakes were calculated. Shatter is produced during the early stages of lithic reduction and is expected to be more abundant than other debris categories at sites where initial reduction was common. At 11MO841, the shatter:flake ratio is 1:1.08, indicating that shatter and flakes occur in roughly equal amounts. At Nochta, a similar value of 1:1.02 was derived. The value from Black Earth is 1:1.6, suggesting that early-stage reduction was somewhat less common at this site than either 11MO841 or Nochta.

Additional information on lithic-reduction stages can be gleaned through a consideration of core to flake ratios. Data derived from a surface survey in Lookout Valley, Georgia (Jefferies 1982b), indicate that sites located closest to raw material sources produced debris from all stages of reduction and a core:flake ratio of 1:83 while upland sites with more limited access to chert raw materials produced a core:flake ratio of 1:500. At Strong, the ratio of cores to flakes (excluding bifacial thinning flakes) is 1:29. At Nochta, this ratio is 1:18, and at Black Earth it is 1:237.9. These figures suggest that early-stage lithic reduction was most common at Nochta, followed closely by 11MO841. Early-stage reduction was not a common activity at Black Earth (Morrow 1982:1299). The bias towards early-stage reduction debris at Nochta is probably the result of the expedient lithic technology that was geared simply towards the production of flakes and debris that could be utilized without further modification.

One final measure of lithic-reduction stages to be considered here is the ratio of bifacial thinning flakes to percussion flakes. At Strong, this ratio is 1:19.4. No bifacial thinning flakes were recovered from the Nochta site. At Black Earth, the ratio is 1:4.7. These figures suggest that bifacial thinning flakes, which represent intermediate- to late-stage reduction activities, are more common at Black Earth than at Strong. These figures are more revealing when considered in the context of a manufacturing trajectory such as that developed for Middle to Late Archaic sites in northeast Mississippi (Johnson 1981; Morrow 1982:1300). Here, quarry/early-stage reduction sites produced ratios of 1:160.7 (160.7 percussion flakes for each bifacial thinning flake) while intermediate- to final-stage lithic reduction sites produced ratios of 1:3.1. While Strong does not fit the early-stage category, it is closer to the early end of the trajectory than Black Earth, suggesting that intermediate- to late-stage lithic reduction was more commonly performed at the latter site.

Summary

In summary, the stone tool assemblage from the Strong site suggests lithic artifact production, particularly biface manufacture, was an important activity at this site. Comparison with other Middle Archaic sites suggests that fewer activities were performed here than at year-round occupations such as the Black Earth site. On the other hand, comparison with the seasonal, short-term occupation at the Nochta site suggests that a wider range of activities was conducted at the Strong site. While the meager ground-stone assemblages from both Strong and Nochta suggest that food processing occurred at both sites, the data from Strong indicate that lithic tool production was an important activity at this site. On the other hand, there is little evidence for lithic tool manufacture at Nochta while the relative abundance of *pièces ésquillées* suggests that tools made from perishable materials such as bone, antler, or wood may have been more important at this site. Noticeably rare at Strong are scraping tools, a type which appears to be especially abundant at more sedentary settlements such as Black Earth.

Analysis of the diagnostic projectile points from Strong resulted in the recognition of a new, previously undefined corner-notched/expanding-stem type which has been named the Valmeyer Corner Notched point. As is discussed in Chapter 9, this point type is considered diagnostic of the newly defined Dennis Hollow phase of the Middle Archaic. With the exception of two Late Archaic types, the diagnostic projectile points recovered from Strong indicate a Middle Archaic temporal affiliation and are consistent with the radiometric dates derived from the site.

The great amount of chert block shatter, number of multidirectional cores, and abundance of utilized flakes suggest that an expedient reduction system and tool kit were utilized at the site. It has been argued that the abundance of naturally occurring chert raw material near the site explains the use of this reduction strategy at the Strong site.

Lithic raw material data indicate that locally available cherts from the Valmeyer Anticline in nearby Dennis Hollow were primarily utilized. The data also suggest that Burlington chert was preferred for projectile point production, and may have been incorporated into a core reduction system directed towards the production of blanks and preforms for hafted bifacial tools. Nonlocal lithic materials are rare at 11MO841but indicate contact with southern and southeastern Illinois to a maximum distance of approximately 200 km. Finally, the raw material data suggest that activities conducted from the site did not involve long-distance interregional movements.

Viewed in the framework of Binford's (1980, 1982) model of logistical settlement, it is proposed that the Strong site represents a field camp, which is defined as a temporary center for special purpose task groups. Field camps generate debris resulting from both short-term subsistence activities and special-purpose resource acquisition and are intensively used sites which produce a high density of cultural debris (Ahler et al. 1992; Carlson 1979).

CHAPTER 6.
PALEOETHNOBOTANICAL ANALYSIS

Archaeological investigations at 11MO841 conducted in advance of the relocation of the Village of Valmeyer resulted in the identification and excavation of 66 subsurface pit features. These features, dating to the early portion of the Middle Archaic period between 6800 and 6500 B.P., provide an excellent opportunity to examine patterns of plant usage in an upland setting adjacent to the Mississippi River floodplain. During the course of excavations at 11MO841, systematic collections of feature fill were made later flotation analysis (see Chapter 4, Volume 1 for detailed discussion of the methods). Flotation of systematically and volumetrically controlled fill samples provides a means of addressing questions of subsistence practices and changes in subsistence through time with quantitative data.

Botanical remains recovered from archaeological sites offer the researcher a unique class of materials by which the dimensions of man-plant relationships may be explored, both in terms of environmental context and change through time. While the recovery of cultural artifacts may give an indication of the broad scope of economic activities undertaken by an archaeologically known cultural entity, preserved plant tissues allow for a much finer-grained view of the nature of economic pursuits and the cultural choices on which that group was dependent. Archaeobotanical materials, when analyzed, may provide several types of information of interest to the archaeologist: phylogenetic relationships, usually when domesticated or cultivated plants are involved; data on cultural choice and habitat preference; seasonality of plant exploitation and site occupation; and paleoenvironmental reconstructions that are based in part on the types and quantities of preserved plant remains. Some authors (e.g., Ford 1982:282–295) draw distinctions between *archaeobotany*, the identification of plant remains from archaeological sites and *paleoethnobotany*, which may be regarded as the analysis of plant remains with the goal of describing and interpreting the cultural adaptation to the floral environment and the direct relationships between man and plant. These latter goals are adopted here and form the framework within which the 11MO841 botanical assemblage is analyzed and considered.

Results

After all collected flotation samples were processed, a subsample was chosen for archaeobotanical analysis (Figure 6-1). Features selected for inclusion in the sample were chosen on the basis of several criteria. First, all six pits selected for radiocarbon dating were included in the sample of pits to be analyzed. Second, all eight Class II pits were selected so that potential variation within pits could be assessed with regard to depositional zones and possible functional differences. Finally, 11 additional Class I pits characterized by single-fill episodes were randomly selected to complete the sample. The final sample of features selected for archaeobotanical analysis consists of 23 features with 270 liters of processed fill, representing 35 percent of the total feature population excavated at the Strong site. The archaeobotanical assemblage consists of 24,749 fragments weighing 297.9 g. Results of the archaeobotanical analysis are presented in Tables 6-1 and 6-2. Table 6-3 summarizes the assemblage and provides a breakdown of the remains by feature class. As illustrated in Tables 6-1 and 6-2, the archaeobotanical assemblage is dominated overwhelmingly by carbonized nutshell, with wood charcoal and carbonized seeds contributing only a fraction of the total remains.

Wood Charcoal

The carbonized wood remains recovered at the Strong site consist of 791 pieces weighing just 6.8 g. Overall, the wood assemblage is highly fragmented and abraded. A total of 121 pieces from the ≥2 mm sieve fraction was identifiable. Twenty-three percent (n=28) of the identified fragments were classified

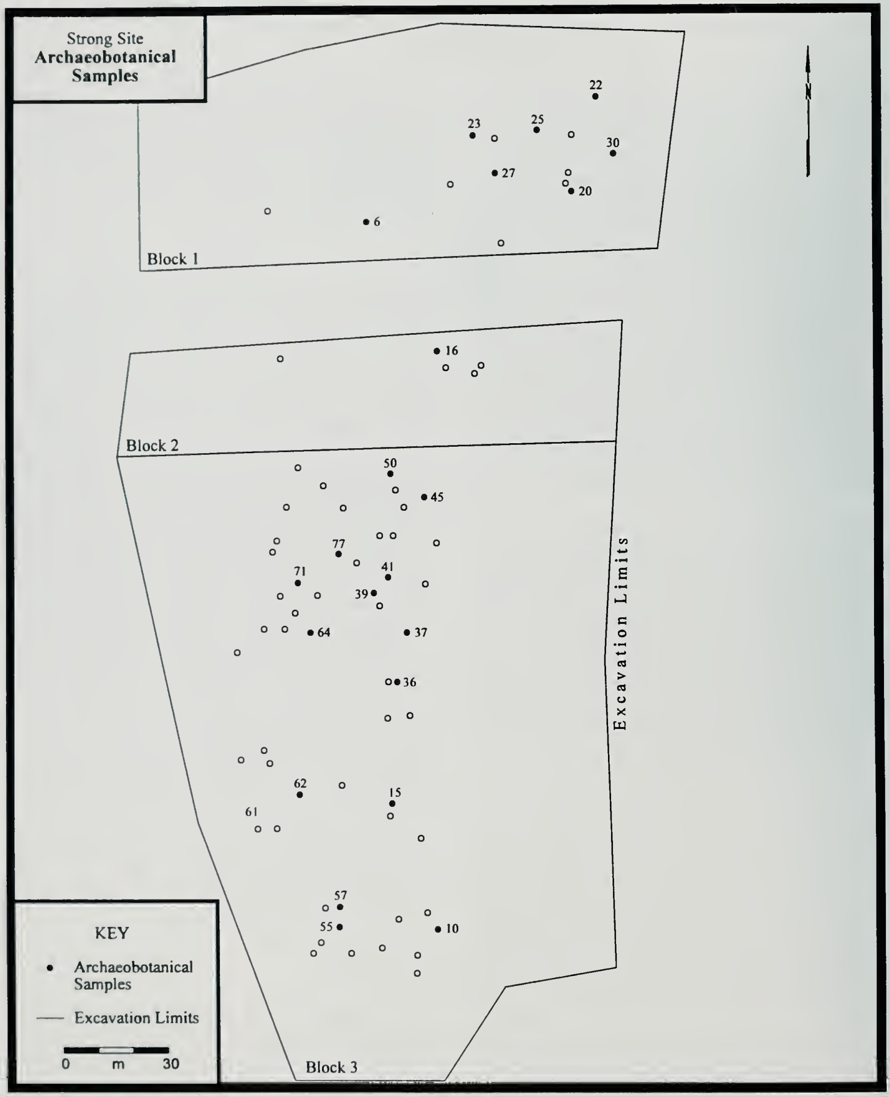

Figure 6-1. Locations of Features Selected for Archaeobotanical Analysis.

Table 6-1. Archaeobotanical Remains from Class I Pits at 11MO841.

Taxa	Fea 16	Fea 22	Fea 23	Fea 25	Fea 30	Fea 36	Fea 37	Fea 41
No. of Samples	1	1	1	1	1	1	1	2
Volume (liters)	8	10	8	8	10	8	10	18
Identified wood[a]	15	5	10	0	0	14	0	0
Wood								
Quercus spp.	6	0	0	0	0	10	0	0
Ring-porous	9	5	10	0	0	4	0	0
Total wood–ct/wt[b]	40/0.3	18/0.2	60/0.6	5/0.1	47/0.1	45/0.2	6/0.1	18/0.4
Nutshell–ct/wt[b]								
Carya illinoensis	88/0.5	197/1.6	69/0.5	29/0.3	20/0.1	0	4/0.2	40/0.3
Carya sp.	1077/14.5	1687/31.9	440/3.9	305/2.8	1347/19.5	279/5.2	525/6.1	768/12.2
Juglans nigra	0	2/0	33/1.7	3/0.1	1/0.1	32/1.2	0	0
Juglandaceae	0	83/0.9	18/0.2	12/0.1	28/0.3	460/2.2	17/0.1	20/0.2
Quercus spp.	3/0	0	0	0	0	0	0	0
Total nutshell	1168/15.0	1969/34.4	560/6.3	349/3.3	1396/20.0	771/8.6	546/6.4	828/12.7
Seeds								
Nelumbo lutea	0	0	0	0	0	0	0	0
Vitis spp.	0	0	0	0	0	0	0	0
Scirpus spp.	0	0	0	0	0	2	0	0
Unidentified	1	4	0	0	0	1	0	0
Total seeds	1	4	0	0	0	3	0	0
Total charcoal–ct/wt[b]	1209/15.3	1991/34.6	620/6.9	354/3.3	1443/20.1	819/8.8	552/6.5	846/13.1
Charcoal density g/10 liters	19.1	34.6	8.6	4.1	20.1	11.0	6.5	7.3
Nut/wood	29.2	109.4	9.3	69.8	29.7	17.1	91	46
Seed/nut	0.0009	0.002	n/a	n/a	n/a	0.004	n/a	n/a

Table 6-1. Concluded.

Taxa	Fea 45	Fea 50	Fea 57	Fea 62	Fea 64	Fea 71	Fea 77
No. of Samples	1	1	1	1	1	1	2
Volume (liters)	10	10	8	9	10	9	18
Identified wood[a]	3	5	3	0	19	0	5
Wood							
Quercus spp.	0	0	0	0	0	0	0
Ring-porous	3	5	3	0	19	0	5
Total wood–ct/wt[b]	7/0.2	7/0.2	7/0.2	19/0.2	36/0.6	0/0	26/0.3
Nutshell–ct/wt[b]							
Carya illinoensis	11/0.1	15/0.5	5/0.1	40/0.4	81/0.7	10/0.2	121/0.7
Carya spp.	932/10.8	306/3.5	252/2.2	374/2.1	760/10.3	77/0.6	856/8.5
Juglans nigra	0	0	4/0.2	23/1.2	14/1.2	0	0
Juglandaceae	0	12/0.1	0	13/0.1	88/0.8	6/0.1	33/0.2
Quercus spp.	3/<.1	0	0	0	0	0	0
Total nutshell	946/10.9	333/4.1	261/2.5	450/3.8	943/13.0	93/0.9	1010/9.4
Seeds							
Nelumbo lutea	0	0	1	0	0	0	1
Vitis spp.	0	0	1	0	0	0	0
Unidentified	0	1	0	4	1	0	1
Total seeds	0	1	2	4	1	0	2
Total charcoal–ct/wt[b]	953/11.1	341/4.3	270/2.7	473/4.0	980/13.6	93/0.9	1017/9.7
Charcoal density g/10 liters	11.1	4.3	3.4	4.4	13.6	0.9	5.4
Nut/wood	135	47.6	37.3	23.7	26.2	n/a	38.8
Seed/nut	n/a	0.003	0.007	0.009	0.001	n/a	0.002

Key: Fea=feature; ct=count; wt=weight.

[a] Maximum 20 pieces identified from each ≥2mm fraction per sample. [b] Totals include all materials in ≥1mm and ≥2mm fractions; all weights in grams.

Table 6-2. Archaeobotanical Remains from Class II Pits at 11MO841.

Taxa	Fea 6	Fea 10	Fea 15	Fea 20	Fea 27	Fea 39	Fea 55	Fea 61
No. of Samples	1	3	1	1	2	2	2	1
Volume (liters)	10	27	9	10	20	18	16	6
Identified wood[a]	3	11	0	13	8	0	0	0
Wood								
Quercus spp.	0	5	0	7	0	0	0	0
Ring-porous	3	6	0	13	8	0	0	0
Total wood–ct/wt[b]	3/0.1	280/1.6	23/0.2	116/0.8	8/0.1	13/0.1	3/0.1	5/0.1
Nutshell–ct/wt[b]								
Carya illinoensis	15/0.3	78/0.7	104/0.7	202/1.3	0	294/1.7	4/0.1	58/0.3
Carya spp.	1051/10.5	3621/46.1	1098/13.1	2584/29.4	234/3.1	1254/12.7	123/1.6	211/3.9
Juglans nigra	23/1.2	0	0	1/0.1	0	0	0	169/7.1
Juglandaceae	0	532/2.3	0	61/0.5	0	3/0.1	191/0.8	391/2.2
Quercus spp.	0	0	0	0	0	0	0	2/<.1
Total nutshell	1089/12.0	4231/49.1	1202/13.8	2848/31.3	234/3.1	1551/14.5	318/2.5	831/13.5
Seeds								
Nelumbo lutea	0	0	0	0	0	0	0	8
Vitis spp.	0	0	0	0	0	0	0	0
Chenopodium sp.	0	1	0	0	0	0	0	0
Unidentified	0	0	0	0	1	0	1	1
Total seeds	0	1	0	0	1	0	1	9
Total charcoal–ct/wt[b]	1092/12.1	4512/51.2	1225/14.0	2964/32.1	243/3.2	1564/14.6	322/2.6	845/13.6
Charcoal density g/10 liters	12.1	18.9	15.6	32.1	3.2	14.6	1.6	22.7
Nut/wood	363	15.1	52.3	24.6	29.3	119	106	166.8
Seed/nut	n/a	0.0002	n/a	n/a	0.004	n/a	0.003	0.01

Key: Fea=feature; ct=count; wt=weight.

[a] Maximum 20 pieces identified from each ≥2mm fraction per sample. [b] Totals include all materials in ≥1mm and ≥2mm fractions; all weights in grams.

as oak (*Quercus* sp.), and the remaining 87 percent (n=93) were identifiable only as ring-porous hardwood. The identified wood taxa indicate that the immediate area surrounding the occupation area at Strong, largely oak-hickory forest, was the source of most, if not all, of the fuel supply for its occupants. Such a collection strategy is expected under the Firewood Indifference Hypothesis proposed by Asch and Asch (1985b:346) to account for observed patterns of wood charcoal in archaeological sites. This hypothesis treats wood charcoal assemblages as representing the result of least effort, or minimization of effort, by a site's inhabitants with respect to firewood collection for heating and cooking.

Table 6-3. Strong Site Summary Archaeobotanical Statistics.

	Total Assemblage	Class I Pits	Class II Pits
Number of features analyzed	23	15	8
Volume of analyzed sediments (liters)	270	154	116
Total archaeobotanical sample (no. of pieces)	24,749		
Total weight (g)	297.9		
Nut/wood ratio	30.2	21.0	27.3
Seed/nut ratio	.001	.002	.001
Grams charcoal/10 liters	10.4	10.1	12.3
Wood count/10 liters	29.3		
Wood weight/10 liters (g)	25		
Nutshell count/10 liters	886.2		
Nutshell weight/10 liters (g)	10.8		
Seed count/10 liters	1.2		
Nut/wood ratio		21.0	27.3
Seed/nut ratio		.002	.001

Seeds

Carbonized seeds and seed fragments are extremely rare at 11MO841, with 30 examples representing only .12 percent of the total assemblage. Seeds were present in 12 of the pits (52 percent) sampled. Unidentified seeds or fragments account for 53 percent (n=16) of the total seed assemblage. These specimens were either too badly charred, eroded, or fragmentary to allow accurate identifications. Of the identified specimens, those belonging to the American lotus (*Nelumbo lutea*) are the most common. Ten charred seed fragments were identified as *Nelumbo lutea*, accounting for 33 percent of the seed assemblage. The remaining identified seeds include two examples of rush (*Scirpus* spp.), one grape seed (*Vitis* sp.), and a single example of goosefoot (*Chenopodium* sp.).

The mechanisms responsible for the presence of the above-noted seeds within the archaeobotanical assemblage are difficult to characterize given their extremely low frequency of occurrence. Clearly, the recovered seeds do not represent all of the seeds potentially exploited during the site's occupancy but simply reflect those that survived charring and subsequent postdeposition attrition over the course of millennia. Nutlets of the aquatic American lotus (*Nelumbo lutea*), which may have been readily available in the sloughs and backwaters of the floodplain, may be present as a result of their exploitation as a food source. Both the nutlets and starchy tubers of the lotus are ethnographically documented aboriginal food resources in North America, and the remains of this plant have been recovered archaeologically (Harvard 1895; Smith 1933; Walz 1991; Yarnell 1964). A similar rationale may be adopted for the single grape (*Vitis* spp.) seed. Wild grape was utilized in both fresh and dried states, and the plant also may have served medicinal uses (Yarnell 1964:65). The presence of rush (*Scirpus* spp.) and goosefoot (*Chenopodium* sp.) in the assemblage likely reflects accidental inclusion within feature fill. The rush and goosefoot may represent taxa growing within the margins of the sinkhole located near the site. At any rate, the small seed assemblage argues against wild seeds contributing a substantial proportion of the diet.

Nutshell

Charred nutshell accounts for 96.7 percent of the archaeobotanical assemblage by count (n=23,927) and 97.4 percent by weight (291.1 g) (Figure 6-2). Nutshell was recovered from all of the pits sampled; the data are presented in Table 6-4. Charred shell fragments of thick-shelled varieties of hickory nut, *Carya* spp., total 20,161 and weigh 254.5 g. These fragments account for 84.2 percent of the nutshell assemblage by count and 87.4 percent by weight. A total of 1,422 fragments weighing 11.3 g was identified as thin-shelled hickory. Taxa included in the thin-shelled hickory group include pecan, *Carya illinoensis,* and bitternut hickory, *Carya cordiformis*. These fragments contribute 5.9 percent of the nutshell by count and 3.9 percent by weight. A total of 305 fragments weighing 14.1 g were identified as black walnut, *Juglans nigra*. Black walnut accounts for 1.3 percent of the nutshell by count and 4.8 percent by weight. Another 1,968 fragments were identified as walnut family but were not large or complete enough to permit more specific identification. These fragments represent 8.2 percent of the nutshell assemblage by count and 3.8 percent by weight. Given the frequency of thick-shelled hickory in this assemblage, many of these fragments reasonably may be attributed to hickory. Finally, only five fragments weighing less than .1 g were identified as acorn shell. Due to the extreme fragmentation of these specimens, no specific identification was possible, and all are identified as belonging to the genus *Quercus*. Acorn accounts for only .02 percent of the nutshell by count.

One means of understanding the nutshell assemblage and the contribution of different nut taxa to the diet is to convert the raw nutshell weights into usable nutmeat estimates. Lopinot (1982, 1984) has devised a methodology for converting the weights of nutshell in an archaeobotanical assemblage into estimates of the uncarbonized nutmeats that were originally contained within the shell. This methodology is based on nutshell:nutmeat ratios derived through experimental means and published sources (Lopinot 1982:Appendix D; 1984:Table 5). The weight of useable nutmeats is derived by the formula Nutmeat=(X)(C)(M), where X= total grams of nutshell of a given taxa, C=the mass conversion factor, and M=the nutmeat:nutshell ratio. For the taxa relevant to this sample, (C)(M) products are the following; hickory (thick shelled + thin shelled)= 1.319; walnut=0.997; and acorn=73.452. The rationale behind these conversions of nutshell to useable nutmeat is readily apparent; nutmeats rather than the nutshell are the target subsistence resource. Furthermore, different nut taxa will have highly variable shell:nutmeat ratios that may overrepresent or underrepresent their dietary contribution if nutshell weights alone are used in reconstructing their importance. These conversions produced nutmeat estimates of 350.6 g of hickory nutmeat, 25.22 g of walnut nutmeat, and <7.3 g of acorn nutmeat from the charred nutshell recovered from the sampled features. Essentially, the results derived from the examination of raw nutmeats, as calculated by the nutshell to nutmeat conversions, mirrors that of the preserved nutshell at 11MO841 in that hickory dominates the assemblage, followed by walnut and a minute quantity of acorn.

Discussion

The archaeobotanical assemblage recovered from the Strong site represents a typical midcontinental Archaic assemblage in that it is dominated by charred nutshell. In part, this predominance can be attributed to the density and durability of nutshell with respect to other less robust plant tissues that are less likely to survive charring and subsequent deposition within feature contexts. Be that as it may, however, cultural patterning in resource procure-

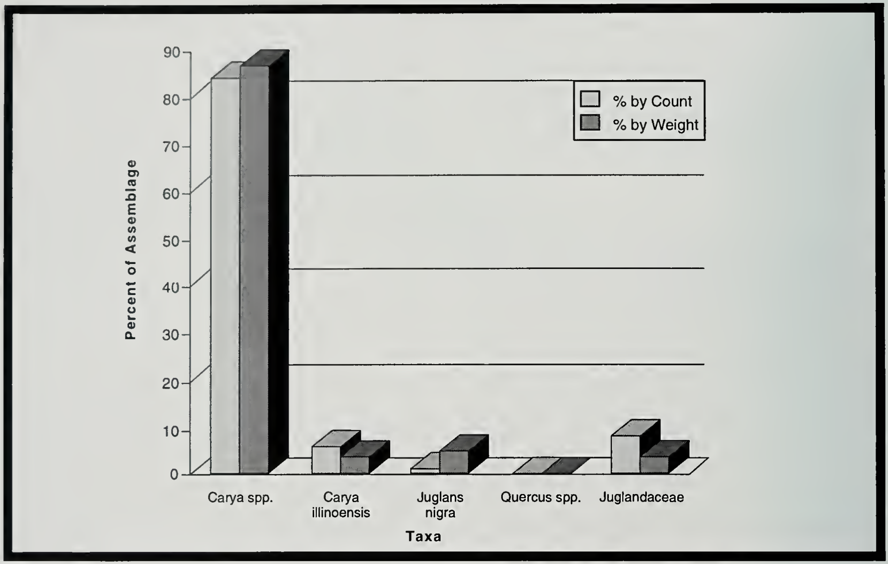

Figure 6-2. The Strong Site Nutshell Assemblage.

ment strategies that focused on nut masts during the Middle Archaic and subsequent Late Archaic period is mainly responsible for the high representation of nutshell within the assemblage (Asch et al. 1972; Asch and Asch 1985a; Chapman and Watson 1993; Christensen 1986; Ford 1974; Jefferies 1995).

While the assemblage is dominated by hickory nutshell, representing the intensive collection of this upland resource, resources potentially collected from the floodplain also are present in the features sampled. The thin-shelled hickories, especially *Carya illinoensis*, are common components of mesic and floodplain forest communities (Jones 1963; Mohlenbrock and Voigt 1959) and could have been found within several kilometers of the site. Seeds that may have originated from floodplain contexts and were recovered from the flotation samples include those of rush (*Scirpus* spp.), lotus (*Nelumbo lutea*), and possibly goosefoot (*Chenopodium* sp.). Rush and lotus are likely to have been common in backwater lake habitats on the floodplain while goosefoot is an adventive colonizer of disturbed open areas. It is possible, however, that the lotus and even the rush may have been available locally in upland sinkhole pond contexts (Steyermark 1963) since several large sinkholes are located adjacent to the site area. Regardless of the ultimate origins of the seeds represented within the flotation samples, seed procurement appears to have been an incidental or minor dietary pursuit during the Middle Archaic occupations of the Strong site.

Table 6-4. Summary Nutshell Data.

Taxa	Percent by Count	Percent by Weight
Carya sp. (Thick-shelled) 20,161/254.5g	84.2	87.4
Carya illinoensis/C. cordiformis 1,422/11.3 g	5.9	3.9
Juglans nigra 305/14.1 g	1.3	4.8
Juglandaceae 1,968/11.2 g	8.2	3.8
Quercus spp. 5/<0.1 g	<.1	<.1
Total 23,927/291.1g	100.0	100.0

Importantly, no evidence for the presence of squash (*Cucurbita* spp.) or any of the weedy annuals comprising the so-called Eastern Agricultural Complex was recovered from 11MO841 (with the exception of a single charred *Chenopodium* sp. seed that represents a wild morph). Squash remains have been recovered from Middle Archaic contexts at Koster and Napoleon Hollow in the lower Illinois River valley as have seeds of the sunflower, *Helianthus annuus* (Asch and Asch 1985a). The presence of squash rind fragments, likely attributable to indigenous rather than mesoamerican varieties of *Cucurbita* in Middle Archaic and later contexts in the midcontinent is indicative of a slow coevolutionary process between humans and plants that would lead to greater reliance on horticultural activities (Jefferies 1995:125; Smith 1992; Smith et al. 1992).

Examination of the archaeobotanical assemblage by feature type reveals that the distribution of remains is essentially the same for both Class I and Class II pits (Table 6-3). The multizone Class II pits do appear to have a higher overall charcoal content but a lower nut/wood ratio than the single-zone Class I pits. While the differences in relative proportions of nutshell and wood are small, they may indicate differential uses for the two categories of features represented at the site. More likely, however, the observed differences are attributable to preservational factors.

Directly comparable Middle Archaic data from the immediate American Bottom region are limited to a single site, Nochta, excavated as part of the FAI-270 Project (Higgins 1990). Here, 63 features attributable to the Middle Archaic occupation of this floodplain site were subjected to flotation sampling and subsequent archaeobotanical analysis. Overall, the pattern of extensive reliance on nuts, especially hickory nuts, is replicated at Nochta where charred thick-shelled hickory comprises nearly 55 percent of the nutshell assemblage by weight. Estimated nutmeat yields (following Lopinot 1984) reveal that hickory accounts for 85.5 percent of available nutmeats (Simon 1990:240). Seeds are extremely rare in the Nochta Middle Archaic features, representing just .03 percent of the assemblage, and their presence within the sampled features is difficult to ascribe to either cultural or natural depositional processes. As noted for the Strong site, however, the contribution of wild seeds to the overall diet is likely to have been minimal.

Modoc Rock Shelter, located south of 11MO841 at the base of the eastern Mississippi River valley bluffs, also has produced a Middle Archaic archaeobotanical record dominated by thick-shelled hickory nuts. Here, the Middle Archaic focus on hickories is in contrast to the earlier predominance of thin-shelled or pecan-hickories, with lesser amounts of hazel and black walnut in Early Archaic strata. In general, the trends in plant usage recognized at Modoc indicate an increasingly specialized exploitation focusing on thick-shelled hickories at the expense of other nut taxa through time and correlated with longer-term site occupations during the Middle Archaic (Styles et al. 1983).

Overall, the archaeobotanical assemblages from Strong, Modoc, and Nochta are indicative of heavy reliance on nuts, especially hickory nuts, as major components of the Middle Archaic diet. This predominance of nuts at these sites is notable given their differing topographic and environmental settings. The predominance of thick-shelled hickory in the Strong, Modoc, and Nochta archaeobotanical assemblages during the Middle Archaic is indicative of an exploitation strategy geared toward the procurement of this resource in a logistical fashion. Binford (1980) characterizes logistically organized groups as practicing a collection strategy while those utilizing a more generalized residential mobility strategy are deemed foragers. A logistical strategy is expected to be highly effective in situations where target resources are unequally distributed across the landscape, making their exploitation more efficient by adopting a logistical rather than a residential mobility approach.

Ahler (1984) suggests that the observed distributions of Middle Archaic sites in the vicinity of the Modoc Rock Shelter, where they are most common in the topographically varied ravine-cut areas east of the bluff crest and the adjacent uplands, may reflect a strategy aimed at minimizing mobility between the floodplain and the uplands and/or the concentration of target resources in this topographic zone. Such a concentration of Middle Archaic sites in the upland margins above the Mississippi Valley may be indicative of climatically induced vegetational change associated with the Mid-Holocene Hypsithermal Interval that was more pronounced in its effects on vegetational communities than previously thought (Ahler 1984:160). Alternatively, the preponderance of Middle Archaic sites in the upland margins may simply reflect the concentration of target resources such as hickory nuts in this portion of the landscape regardless of the climatic regime. A broader regional perspective on Middle Archaic subsistence may be gained by the examination of several sites in the Lower Illinois River Valley.

Stafford (1991) has summarized the findings of a series of investigations at Middle Archaic sites located in the Lower Illinois River Valley and adjacent tributaries in which nutshell remains dominate the archaeobotanical assemblages. These sites, including Buckshaw Bridge, Elizabeth, DOC, Koster, Slim Lake, and Campbell Hollow, represent the Middle Archaic utilization of a variety of topographic and environmental zones through the occupation of both base settlements such as Koster and more specialized sites such as Buckshaw Bridge and Slim Lake. Nutshell remains, again principally thick-shelled hickories, are abundant regardless of the topographic setting of a particular site, suggesting that during the Middle Archaic, settlement systems in the Lower Illinois Valley cross-cut environmental zones. Composition of the nutshell assemblages does indicate that procurement strategies changed through time, however. In pre-7000 B.P. assemblages from Napoleon Hollow, Koster, and Campbell Hollow, black walnut dominates the assemblages while later Middle Archaic components are characterized by the predominance of hickories (Stafford 1991:224). This shift toward a greater reliance on hickory nuts during the later portion of the Middle Archaic is interpreted as representing the initiation of logistically organized resource procurement in the Lower Illinois valley. Prior to 7000 B.P. a residentially organized foraging pattern was in place within which a wider spectrum of nut resources were utilized as they were encountered within differing environmental settings. The shift to a nearly exclusive reliance on hickory nuts after 7000 B.P. is in part attributed to the bulk extraction of nut oil through the employment of hot-stone boiling techniques (Battle 1922; Munson 1986), a strategy that is more effectively undertaken from special-purpose loci established in relation to productive stands of nut-bearing hickories. Indeed, the sites with the highest proportion of hickory nuts in the archaeobotanical assemblage are those that occupy tributary valley (Buckshaw Bridge) or upland margin (Elizabeth, DOC, Elledge) settings where hickory nut masts would have been readily exploited (Stafford 1991:215–221). Figure 6-3 portrays two ratios: grams of charcoal:10 liters of fill, and nut:wood charcoal calculated for several sites in the lower Illinois River valley and the Strong and Nochta sites in the American Bottom region. These ratios characterize the relative contributions of nut and wood charcoal to the overall archaeobotanical assemblage from each site. The ratios are expressed in log base 10 to compensate for divergent assemblage sizes.

The pattern of a nearly exclusive exploitation of hickory nut masts as evidenced at the Middle Archaic sites discussed above points to the initiation of logistical foraging strategies that would continue to be employed effectively throughout the succeeding Late Archaic and well into the Woodland period in the riverine midcontinent. The long-term efficacy of this strategy was in part responsible for, and resulted from, increasing sedentism and population aggregation, growing social differentiation, and interregional exchange that characterize the Middle and Late Archaic periods.

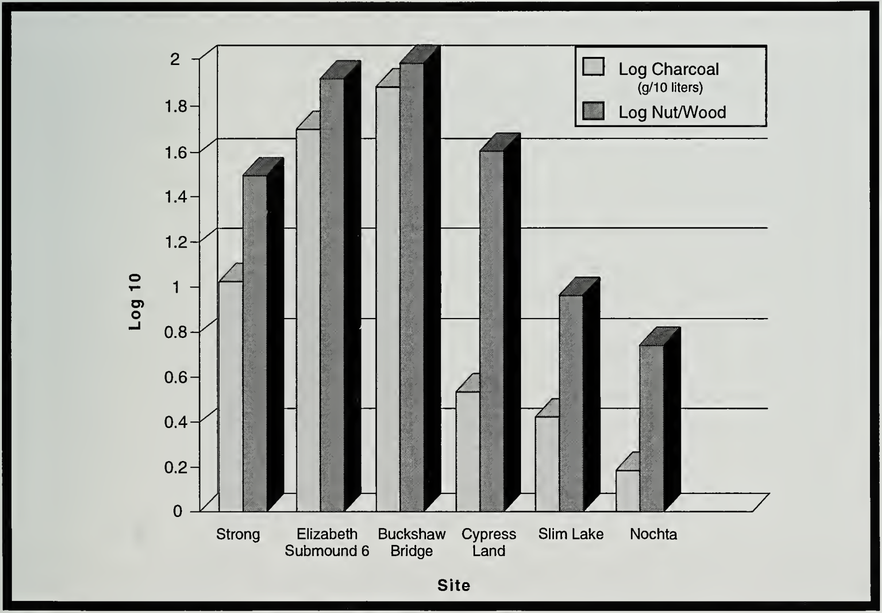

Figure 6-3. Comparison of the Strong Site Botanical Assemblage with Other Middle Archaic Botanical Assemblages.

CHAPTER 7.
FAUNAL REMAINS

A total of 65 faunal elements from ten features was recovered from general excavation and flotation samples at 11MO841 (Table 7-1). Faunal remains were identified as amphibian (n=22; 34 percent), mammal (n=12, 19 percent), large mammal (n=10, 15 percent), or vertebrate (n=21, 32 percent). No specimens could be identified below the level of Class because of the fragmentary nature of the remains recovered. While all mammal, large mammal, and vertebrate remains are burned, none of the amphibian elements exhibits evidence of burning. Feature 45 yielded the most faunal remains of any feature (n=22), all unburned amphibian elements. This pattern contrasts with that of the other six features, which contained burned mammal or vertebrate elements. It appears likely that the unburned amphibian elements from Feature 45 represent intrusive specimens. Due to the small and highly fragmented nature of the assemblage, little information on Middle Archaic faunal exploitation and its role in subsistence patterns can be obtained. The poor preservation is consistent with that of the McLean site (McElrath 1986), a Late Archaic site in a similar physiographic setting.

Table 7-1. Distribution of Faunal Remains.

Provenience	Amphibian	Mammal	Large Mammal	Vertebrate	Total
Feature 5	0	1	0	0	1
Feature 12	0	0	2	0	2
Feature 16	0	0	0	1	1
Feature 28	0	1	0	2	3
Feature 32	0	3	0	1	4
Feature 33	0	3	0	11	14
Feature 45	22	0	0	0	22
Feature 47	0	0	3	0	3
Feature 51	0	0	0	5	5
Feature 74	0	3	4	1	8
Total	22	12	10	21	65

CHAPTER 8.
CLAY REMAINS

Clay remains at 11MO841 are limited to several pieces of burned clay. The burned clay category consists of oxidized clays and silts. Thirty-seven pieces of burned clay weighing 107.2 g were recovered from 12 features (Table 8-1). None of the pieces has thatch or stick impressions that indicate use as daub in construction. They are all irregularly shaped, roughly oval, or circular in form. Most are small, measuring less than 1 cm in diameter and weighing less than 1.0 g. Only one piece is larger, weighing 50.4 g and representing nearly one-half the total weight of the sample. Although no evidence of in situ burning is present in any of the features excavated, these pieces probably resulted from fires used for cooking and heating and are not of intentional manufacture.

Table 8-1. Distribution of Burned Clay in Features.

Provenience	Number	Weight (g)
Feature 9	1	.8
Feature 10	3	1.1
Feature 11	5	2.7
Feature 16	1	.5
Feature 17	4	56.5
Feature 26	1	1.5
Feature 28	5	2.0
Feature 30	2	.5
Feature 56	1	.7
Feature 70	1	.5
Feature 74	11	40.1
Feature 77	2	.3
Total	37	107.2

CHAPTER 9.
DISCUSSION AND CONCLUSIONS

With the advent of the planned relocation of families, businesses, churches, and village offices from the Village of Valmeyer on the floodplain of the Mississippi River to the bluff overlooking that location, the Phase III mitigation of 11MO841 proved critical. The Phase III mitigation of this site was one of the many regulatory steps necessary in the attempt by FEMA to relocate individuals and organizations devastated by the Great Flood of 1993 and thus reestablish the social fabric of the Village of Valmeyer. Against this backdrop, it also was necessary to recover the archaeological data present prior to the construction of houses, buildings, roads, and infrastructure on the site area and thus prevent the destruction of this irreplaceable resource. The Public Service Archaeology Program completed the Phase III mitigation of the 11MO841 site area within one month, enabling both the preservation of the archaeological data and the planned construction activities to proceed in a timely manner.

The Phase III mitigation of 11MO841 resulted in the identification of 66 prehistoric pit features and the recovery of almost 17,000 artifacts. Equally important is the large paleobotanical sample recovered through soil flotation samples from the excavated features and the data on the spatial patterning of the features themselves across the landform. The results of the excavations and artifact analyses have been presented in Chapters 4 through 8 of this volume. These chapters provide evidence for an initial discussion of the Dennis Hollow phase, a previously undefined phase dating to the Middle Archaic period in the uplands along the southern periphery of the American Bottom. This chapter returns to the topics originally discussed in Chapter 3 as the general research orientation for this project. Those topics address the ability of the data obtained from 11MO841 to contribute to Archaic period cultural chronology in the American Bottom, the identification of on-site activities, the identification of Archaic period subsistence strategies, the use of a sinkhole that is present on site, and the role of 11MO841 within the local Archaic period settlement system. Based on the data presented in the previous chapters, the focus of these five research topics, when robust data are available, is on the formal definition of the Middle Archaic Dennis Hollow phase. These five topics, then, are discussed below.

Contributions to Chronology Building

One of the central research goals of the Strong site mitigation project was the recovery of data with which to date the occupation of the site and to place that occupation into a regional chronological framework. Accurate chronological placement of the site within the existing midcontinental Archaic cultural/ chronological constructs is essential to defining the proper archaeological context when addressing issues of site function, subsistence and settlement patterns, and technology. Two categories of data, charred botanical residues submitted for radiometric assay and the typological analysis of temporally diagnostic projectile points, were used to provide both chronometric and relative means of dating the Strong site occupations. The use of both chronometric and relative dating techniques at the Strong site allows for each of the methods to be used as a cross-check on the other. On the basis of the radiocarbon assays and analysis of the diagnostic lithic assemblage, the Strong site is attributed to a poorly documented portion of the Middle Archaic period, and the distinctive projectile point assemblage is used as a basis for a new Middle Archaic phase in the southern American Bottom region.

Radiocarbon age determinations from six samples of charred nutshell and wood charcoal recovered taken from feature contexts place the occupation of the site between 6900 and 6500 B.P. (Table 4-2), or during the Middle Archaic period. These dates are earlier than those obtained from the Middle Archaic component at the Nochta site located in

Madison County, Illinois, the only excavated American Bottom site to produce Middle Archaic radiocarbon dates and diagnostic lithic artifacts. The Nochta phase, ca. 6500–6100 B.P., represents the first named Middle Archaic phase in the American Bottom region (Higgins 1990). Thus, the Strong site represents an earlier manifestation of Middle Archaic presence in the American Bottom region and permits the extension of the established regional chronological framework. Figures 9-1 and 2-2 illustrate relevant regional Archaic period radiocarbon dates and the Middle Archaic phase chronology for several regions within the midcontinent. While no excavated sites of comparable age are known from the immediate American Bottom region, contemporaneous Middle Archaic occupations are present to the south at Modoc Rock Shelter and to the north in the lower Illinois River valley.

An extensive suite of radiocarbon dates obtained from Modoc Rock Shelter located at the base of the eastern Mississippi River valley bluffs in Randolph County, Illinois, documents the use of this shelter during the same period that the Strong site was occupied. Middle Archaic strata have been dated from both the West Shelter and Main Shelter at Modoc to between 8000 and 5000 B.P. Intensive, long-term utilization of the Modoc site is indicated between 7200 and 4500 B.P. when the site is believed to have functioned as a Middle Archaic base camp (Ahler 1993). Middle Archaic age determinations also have been obtained from several sites in the lower Illinois River valley including Koster, Napoleon Hollow, Campbell Hollow, Slim Lake, Cypress Land, Elizabeth, and Elledge (Brown and Vierra 1983; Stafford 1989, 1991; Wiant et al. 1983). Together, data from these sites have been used in the construction of a Middle Archaic period chronology for the lower Illinois River valley that is initiated at 8300 B.P. with the Middle Archaic 1 phase, 8300–7600 B.P., and followed by Middle Archaic 2, 7300–6850 B.P., and the late Middle Archaic Helton phase, 5800–4900 B.P. (Brown and Vierra 1983). Middle Archaic dates, between 8000 and 5500 B.P., also are recorded at the Black Earth site, an intensively occupied site located in Saline County in southeastern Illinois (Jefferies and Butler 1982).

While a number of sites have produced Middle Archaic age determinations similar to those at the Strong site, the diagnostic projectile points associated with these dates are very different from those recovered from dated Middle Archaic contexts at Strong. At Nochta, Modoc, Black Earth, and the lower Illinois River valley sites, the projectile point assemblages associated with the Middle Archaic dates are dominated by side-notched types. These assemblages include such named types as Godar, Raddatz, Oceola, Big Sandy, Thebes, Robinson, Matanzas, and Brannon. At the Strong site, however, the projectile point assemblage is composed almost entirely of the Valmeyer Corner Notched variety (n=10). Other types present include single examples of an as yet untyped corner-notched/expanding-stem point similar to those reported by Lopinot (1991) at the Ferry site, Robinson, Karnak Shouldered, and a minimally modified flake point that complete the Middle Archaic projectile point assemblage. Two Late Archaic point types, Saratoga Expanding Stem (n=2) and Ledbetter (n=1), were recovered from the site in nonfeature contexts. The predominance of Valmeyer Corner Notched points is considered to be an important attribute of the Strong site assemblage. Previous studies have indicated that while many Middle Archaic assemblages are dominated by large side-notched types, corner-notched and expanding-stemmed forms are present at a number of sites in small numbers. Fowler (1957) notes the presence of such types in Middle Archaic contexts from such sites as Graham Cave in the Missouri Ozarks and the Faulkner and Modoc sites in Illinois. Fowler also indicates that corner-notched/expanding-stem forms are present as minority components of the assemblage for several thousand years at Modoc before supplanting side-notched varieties in the assemblage around 5000 B.P. (Fowler 1959:36), a conclusion supported by recent research on Modoc Rock Shelter collections (Steven Ahler, personal communication 1996).

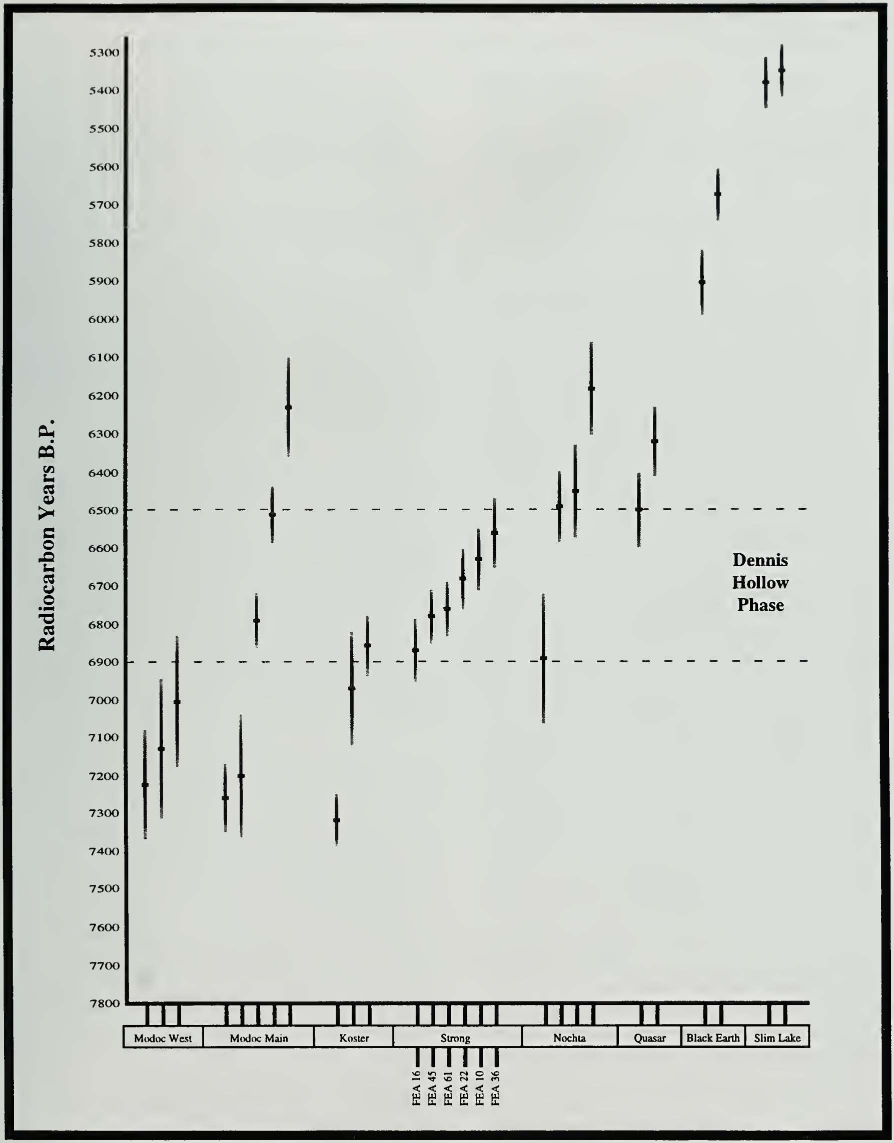

Figure 9-1. Selected Middle Archaic Radiocarbon Dates.

Corner-notched points, similar to the Valmeyer Corner Notched type and designated Cypress Creek I, are present in the Eva component at the Eva site in western Tennessee dating from 8000–7200 B.P. (Lewis and Lewis 1961). While the Valmeyer and Cypress Creek I points are broadly similar, minor differences in notch metric attributes are present.

At present, it would appear that the distinctive Valmeyer points represent a manifestation of continuity between Early and Late Archaic assemblages within which corner-notched projectile points are common. Considered in this manner, the Valmeyer Corner Notched type represents a link between earlier corner-notched point styles such as Kirk or Stilwell, and Late Archaic types such as Falling Springs, examples of which are common in the American Bottom region.

Dennis Hollow Phase

On the basis of the radiocarbon age determinations and the distinctive corner-notched projectile points recovered at the Strong site, a new Middle Archaic phase, the Dennis Hollow phase, is proposed for this Middle Archaic manifestation in the southern American Bottom region. The Dennis Hollow phase is provisionally dated between 6900 and 6500 B.P. and thus becomes the initial Middle Archaic phase in the American Bottom region, immediately preceding the Nochta phase (ca. 6500–6100 B.P.). This temporal placement is also intermediate between the terminal Middle Archaic 2 and the later Helton phase in the lower Illinois River valley. Both the Nochta phase of the American Bottom and the Middle Archaic 2 phase in the lower Illinois River valley are correlated with side-notched projectile point types (Brown and Vierra 1983; Higgins 1990).

Willey and Phillips (1958:22) define an archaeological phase as:

> ...an archaeological unit possessing traits sufficiently characteristic to distinguish it from all other units similarly conceived, whether of the same or other cultures or civilizations, spatially limited to the order of magnitude of a locality or region and chronologically limited to a relatively brief interval of time.

They further argue that a phase may be defined on the basis of a single site or component with the implicit expectation that other similar sites or components exist (Willey and Phillips 1958:21–22). Within this conceptualization of an archaeological phase are the possibilities that a phase may, in fact, be theoretically limited to a single component and that a phase may be equated with a single community (Willey and Phillips 1958:49).

Following this definition of an archaeological phase, it is proposed that the Strong site occupations fit this definition on the basis of the following criteria: the 400-year span of dates and uniformity of cultural features present at the site; the lack of significant variation in any material assemblage class represented at the site; and the predominance of the distinctive Valmeyer Corner Notched projectile point in the assemblage during a period when similar projectile point types are at best minority components of midcontinental Middle Archaic assemblages. Thus, the temporal parameters and diagnostic projectile points defining the Dennis Hollow phase are readily observable and, following Willey and Phillips (1958), it is reasonable to expect the existence of sites of similar age containing similar projectile point styles within the region. While the temporal placement and diagnostic projectile point assemblage used to define the Dennis Hollow phase are easily appreciated, the issue of the spatial parameters of the phase are less readily addressed at this time. The lack of known Middle Archaic sites dating between 6900 and 6500 B.P. in the immediate American Bottom locality clearly hampers our ability to begin to impose spatial limits on the Dennis Hollow phase as does the near complete absence of excavated upland Middle Archaic sites in this portion of the Mississippi River valley.

The presence of corner-notched projectile points in certain Middle Archaic sites in the midcontinent such as Modoc Rock Shelter, although always in minority numbers, is also somewhat problematic. While we have defined the Dennis Hollow phase in part on the basis of its distinctive projectile point assemblage, how it relates to sites where similar points are present, but not numerically dominant, poses an interpretive problem. It is possible to ascribe the observed differences in the frequency of corner-notched and side-notched projectile points in Middle Archaic assemblages simply to idiosyncratic behaviors that favored the production of one type over the other at different sites. This explanation, however, is unsatisfactory as it can account neither for the low frequency of occurrence of corner-notched points within Middle Archaic assemblages over thousands of years of occupation at certain sites, only to become the prevalent type during the later terminal Middle Archaic and Late Archaic periods, nor their apparent popularity at the Strong site. At present, however, the broader issue of a more detailed explanation for the observed differences in Middle Archaic projectile point assemblages in terms of the frequency of occurrence of side-notched versus corner-notched forms remains to be formulated.

Site Function

As discussed in Chapter 3, the analysis of site function is divided into two related issues: potential activities conducted at 11MO841 and the internal patterning of those activities. To address this issue, two types of data are available. The type and quantity of artifacts and archaeobotanical remains are analyzed in an attempt to identify on-site activities. In addition, the spatial patterning of artifacts and ecofacts within features and the spatial patterning of the features themselves, are analyzed. The results of these analyses then are compared to a model of Archaic period site types to address issues of potential differences in the use of floodplain and upland sites during the Middle Archaic period.

Material Remains

The material remains recovered during the Phase III mitigation of 11MO841 that can be used to address the issue of site function consist of the lithic remains, both debitage and tools, and the archaeobotanical assemblage. Faunal remains are too few to allow for inferences other than that hunting and meat consumption took place at 11MO841. The lithic assemblage indicates that, based on a high ratio of blanks and preforms to finished tools, tool manufacture was an important activity at this site. These tools apparently were not being finished on-site given the low ratio of bifacial thinning flakes to percussion flakes in the lithic debris assemblage. Evidently, most of the blanks and preforms were being removed from the site and used at other locales or traded outside of the area. The emphasis on early-stage reduction activities is further supported by the almost equal ratio of shatter to flakes.

The tools present at 11MO841 can be grouped into three general categories: unfinished formal chipped-stone tools, finished formal chipped-stone tools, and expedient tools. Of the 122 chert tools recovered, 49 percent (n=60) are expedient tools, either utilized flakes or minimally retouched flakes. Such flakes no doubt were used for a number of activities and would have been adequate cutting and scraping implements. Second most common are the unfinished bifaces (n=36, 30 percent), representing tool manufacture, not use. Finally, formal, finished chipped-stone tools comprise only 21 percent of the tool assemblage (n=26). This ratio of fewer formal than expedient tools contrasts with the Nochta site in the American Bottom and most likely represents the ease of access site occupants had to abundant chert resources. While the formal finished tool assemblage is rather sparse, consisting of projectile point/knives, perforators, scrapers, and wedges, the multiple uses to which the expedient tools could be put decreased the necessity of producing finished stone tools for on-site use. Interestingly, this pattern at 11MO841 contrasts with that of the Black Earth site, which is posited to be a Middle Archaic residential base. There, finished chipped-stone tools are in almost equal proportion to utilized flakes while blanks and preforms are the least represented of the three tool categories. These contrasts appear to fit a general model of expectations based on accessability to chert resources where formal tools predominate in chert-poor areas and expedient tools predominate in chert-rich areas.

The other substantial category of material remains from 11MO841 is the paleobotanical assemblage. The assemblage is in many ways typical of Middle Archaic period bluff-edge sites, with thick-shelled hickory nut remains dominating the assemblage but few seeds present. The assemblage indicates the almost complete focalization upon nut resources by the site's occupants. The importance of nut collection, processing, or use may be seen in a comparison of nutshell weight per 10 liters of floated soils between Strong and Nochta. Nutshell weight per 10 liters of soil at Strong is 10.8 g while it is only 1.09 g at Nochta (Simon 1990:Table 22), almost a tenfold difference. In contrast, the Late Archaic component at McLean, also located along the bluff edge overlooking the Mississippi River floodplain, has an average of over 164 g of nutshell per 10 liters of soil. These differences appear to represent both geographic and temporal trends.

Feature Analysis

The analysis of the Middle Archaic period features indicates that 11MO841fits a pattern that is common in the American Bottom region during that time: clusters of generally round features with one (predominantly) or two zones. Such is the case for the Middle Archaic component at Nochta (Higgins 1990) and for the Late Archaic component at McLean (McElrath 1986). The function of the 11MO841 pits, aside from their eventual use as trash receptacles, is uncertain. Evidence for fire, indicative of use as hearths or roasting pits, is entirely lacking at this site. Similarly, no evidence of fire was found in either the Nochta or McLean site features. McElrath (1986:84; see also Battle 1922 and Munson 1986 for similar arguments based on ethnohistoric research) suggests that such features functioned as receptacles for boiling nut meats to extract oils. In this scenario the pits were lined with hides or basketry to retain water, and nut meats were placed in them. Cobbles then were heated in open fires and placed in the water-filled pits to induce boiling and the extraction of nut oils. The fire-cracked rock in the lithic assemblage indicates the presence of fires at the site. Material such as limestone and chert cobbles also could have been used in the heating process at 11MO841. The absence of hearths or open-air fire features at the site may be due to the effects of plowing and erosion, especially if such features were not initially excavated into subsoil. An alternative pit function is that of storage pits. The pits could have been used to store commodities such as nuts across seasons, with the pits eventually being filled with refuse at the end of their usefulness as storage features. In sum, while a specific function cannot be unequivocally identified for the 11MO841 pit features, it is evident that such pits are common across the American Bottom and lower Illinois River valley regions as well as through the Late Archaic period.

Feature clusters such as the ones defined at 11MO841 alternatively have been interpreted to represent kin-based units (McElrath 1986) or repeated occupation events (Higgins 1990). Unfortunately, the data with which to distinguish between these two possibilities are largely lacking. Given the predominance of single zone features, it is likely that their infilling was rather quick. This would suggest that occupations were relatively short at 11MO841. It is also evident that most clusters are associated with areas devoid of features, perhaps representing activity areas. The lack of strong spatial patterning in the distribution of artifacts is indicative of their secondary deposition into the features, but is also suggestive of the relative homogeneity of tasks undertaken across the site area.

Settlement Type Models and 11MO841

Settlement types (and hence inferences of settlement function) in the American Bottom have been viewed largely from a modification of the Binford (1980) residential mobility-logistical mobility continuum (Emerson et al. 1986). Brown (1985) describes the trend in southwestern Illinois as a gradual shift from a system characterized by the dominance of residential mobility during the Early Archaic period to one in which logistical mobility was characteristic during the Late Archaic period. An inference that can be drawn from this is that the Middle Archaic period was a time of transition in both site function and settlement system characteristics. In fact, most Middle Archaic period sites are located in upland settings in the American Bottom region, including all (as of 1986) base camps (Emerson et al. 1986). This pattern shifted during the Late Archaic period to a floodplain-dominated pattern (Emerson et al. 1986). Ahler (1984), noting this trend in the Modoc Rock Shelter vicinity, suggests that this represents the shift from residential mobility to logistical mobility, and that this process was in part due to the effects of the Hypsithermal Interval (although see Emerson et al. 1986 for an alternative view).

Site typologies for the American Bottom region generally have employed three continua in their construction: sedentism-mobility, large site size-small site size, and specialized-generalized artifact assemblage composition (Emerson et al. 1986). Based on these variables, four Archaic period site types have been proposed for the American Bottom and southwestern Illinois: base locales, base camps, residential extractive camps, and extractive loci (Ahler 1984; Emerson et al. 1986). Base locales are representative of large, sedentary occupations with diverse artifact assemblages and have so far been identified with the Late Archaic period. Base camps are medium to large in size, have a high density of artifacts and features, and a diverse assemblage. Residential extractive camps are medium-sized sites, often with numerous pit features, representing short-term occupations. These sites have a generalized tool assemblage within which special emphasis is placed on a particular aspect. Extractive loci are small sites that have a low artifact density and diversity and at which features are absent.

The absence of midden deposits, a truly diverse artifact assemblage, structures, or overlapping features indicates that 11MO841 was not a base camp and that occupation of the site was not continuous. In contrast, neither can 11MO841 be characterized as solely an extractive locale given its size, the presence of numerous pit features, and a relatively moderate density of artifacts. The site fits best the definition of a residential extractive camp. It is moderately sized (ca. 3 ha), has numerous pit features, and has an artifact assemblage that is at once specialized and yet generalized. As discussed above, two activities appear to have been of importance to the site occupants. First, chert collection and tool manufacture were important activities, the end result of which was the production of blanks or preforms that were then, apparently, transported to other sites for further modification and use, or were perhaps traded to other groups. An emphasis on chert collection and tool manufacture is not surprising given the proximity of 11MO841 to Dennis Hollow and its abundant chert sources. In fact, it has been argued that most of the lithic scatters present within the Valmeyer relocation parcel were being occupied for a similar reason (see Volume 1 of this report). Second, the ubiquity of nutshell in feature fill and the relatively large quantity of that nutshell suggest that nut collection and the extraction of nut oils were important aspects of site occupation as well. In fact, given the interpretation of feature function at the McLean site (McElrath 1986), it is possible that all of the features located at 11MO841 were part of the nut oil extraction process. In this sense, the 11MO841 assemblage (tool and feature) is specialized for tool manufacture, nut collecting, and oil extraction.

But in another sense, 11MO841 has a rather generalized tool assemblage. True, the diversity of formal tools, aside from blanks and preforms, is not great. Only 26 formal tools other than blanks and preforms were recovered, and of those, 17 are projectile points. In contrast, 60 expedient tools, minimally retouched flakes or utilized flakes, are present in the assemblage. While the formal tool assemblage is not diverse, the potential for a diversity of uses implied in the expedient tool assemblage is great. This pattern also is expected intuitively based on the proximity of 11MO841 to abundant chert resources. A correlation has been noted between access to raw material and degree of tool formalization and subsequent curation. This model holds that ease of access to chert resources mitigates against the conservation of chert as formal tools, either in their manufacture or long-term curation. Sites located at some distance from chert resources should, on the other hand, evidence greater conservation of scarce chert resources in the formalization of tools and their long-term curation. In general, aside from projectile points, tools were neither formalized nor curated at 11MO841 as is expected given the model of chert conservation. Without high-power magnification use-wear analysis of the expedient tools recovered at 11MO841, the entire range of activities conducted cannot be determined. But, use-wear analyses of expedient tools at other sites indicate that most such assemblages represent a wide range of short-term activities (Yerkes 1987), and it is likely that such can be inferred for the 11MO841 assemblage.

In sum, it appears that 11MO841 represents a residential extractive camp occupied for short periods of time. The number of site occupants at any one time or the number of separate occupations cannot be determined. That none of the features overlap may be due to chance or may indicate that the site represents a few repeated occupations of larger groups, even perhaps over a relatively short span of years. Finally, three activity sets can be identified. Two resources, abundant chert and nut mast, provided the reason for the occupation of the upland ridge on which 11MO841 is located. Chert was collected and worked to manufacture biface blanks and preforms. Perhaps at the same time, nuts were collected and the nut meats extracted and boiled for oil. The third is a generalized, and largely unknown, set of quotidian activities associated with a residential camp. Included was hunting, based on the presence of projectile points and a few faunal remains. Floodplain resources may have been harvested as well. The use of a set of expedient tools to conduct these activities has inhibited the identification of many of these activities.

Sinkhole Usage

Phase II testing at 11MO841 indicated that archaeological material was located in the sinkhole at the northeast edge of the site (McGowan 1994; Volume I, this report). Sinkholes represent potentially rich and unique data sets for the investigation of issues regarding the prehistoric occupation of a site as well as general questions about changing environmental conditions in the area (Butzer 1982). Major research questions addressed during Phase III work at 11MO841 concerned the origins and geomorphic history of the sinkhole and its potential utilization by prehistoric groups in the area. From an archaeological perspective, key issues to be addressed were whether the sinkhole existed during the Archaic period occupation of the site, whether it was a water-filled basin, and how and when artifacts were deposited in it. In order to investigate these questions, the sinkhole was trenched and examined by a geomorphologist. It was anticipated that analysis of sediments and botanical and faunal remains would permit detailed description of the age, genesis, and history of this feature. Further, palynological data, if preserved, were to be used in an analysis of pre-midden, midden, and post-midden deposits to determine if the environment around the sinkhole had changed through time. Such information could provide a better idea of human impact on the area.

Although data derived from the analysis of the sinkhole indicate that it has been present since at least the Pleistocene epoch, no evidence was secured to suggest that it was a water-filled depression during the Middle Archaic occupation of the site. Analysis of the profile exposed in a trench excavated through this feature indicated that there is a thick deposit of postsettlement alluvium/colluvium (PSA) situated above an intact buried Holocene soil. The PSA deposits represent infill which has resulted from erosion and redeposition of the original soil cover as a result of historic agricultural practices. Prehistoric artifacts were found in the basal, humus-rich zone of the PSA which represents an inverted, redeposited A horizon, also referred to as the 1830 paleosol. The artifacts recovered from the sinkhole therefore, are secondarily redeposited and not associated with an undisturbed prehistoric surface in this feature. As the sinkhole fill appeared to be the result of erosion from relatively recent agricultural practices, no attempt was made to recover environmental data for analysis. The buried Holocene paleosol in the sinkhole did not exhibit any features, such as laminations or bedded deposits, which would suggest that it witnessed extensive periods of standing water.

Dennis Hollow Phase Subsistence Strategies

The recovery of data with which to examine the nature of Middle Archaic period Dennis Hollow phase subsistence at the Strong site was one of the primary research goals of the mitigation of this bluff-crest site. Numerous advances in the study of Archaic subsistence issues have been made over the years, largely as a result of the widespread implementation of large-scale flotation sampling of excavated sediments and feature contexts, which has vastly improved the rate of recovery of small-scale archaeobotanical and faunal remains (Jefferies 1995). These advances in subsistence studies have resulted in both finer-grained explanations of synchronic variation between differing strategies of resource procurement and a greater appreciation of diachronic trends in subsistence behaviors. Both synchronic and diachronic approaches to Archaic period subsistence behaviors have led to a fuller reconstruction of the nature of Archaic period cultures and their adaptation to, and impact on, the physical environment.

Evidence of the subsistence pursuits of a site's inhabitants often is preserved in the form of charred botanical remains and faunal elements recovered from cultural contexts. In both cases, these remains represent by-products of subsistence activities, and in the case of charred botanical remains, also may represent accidents in the processing, preparation, or storage of plant resources. Thus, archaeologically recovered floral and faunal remains offer the most direct means of addressing subsistence behaviors at a given site or within a region. Subsistence data also may be used in the reconstruction of past environments and habitat preferences. Such studies utilize measures of sample diversity, presence or absence of taxa with specific habitat requirements, and taxa with known seasonal availabilities to provide a fuller picture of not only the type of resources that were being exploited by a prehistoric group, but also to identify specific strategies that may have been employed to acquire these resources.

Archaeological excavation of 66 subsurface pit features at the Strong site resulted in the recovery of both faunal and floral remains associated with the Middle Archaic occupation of the site between 6900 and 6500 B.P. Unfortunately, the faunal assemblage was poorly preserved, due in part to the acidic loess soils present at the site, and offers little in the way of interpretive value. This small (n=65), badly fragmented sample is in keeping with the character of the Archaic period faunal record for the American Bottom region which, despite the excavation of a number of Middle Archaic and Late Archaic components, remains poorly understood due to postdepositional attrition. As a result of the poor bone preservation at the Strong site, few definitive statements may be made regarding patterns of faunal exploitation by the site's inhabitants. Previous studies on American Bottom Archaic period faunal assemblages, largely restricted to floodplain sites dating to the Late Archaic period, have indicated a generalized strategy was in place that included the exploitation of fish, mussels, deer, and other mammals that would be expected to be readily available within a short distance of the site (Kelly and Cross 1984). In the lower Illinois River valley, a similar generalized faunal exploitation strategy is indicated for the Archaic period, although the exploitation of deer, mussels, and fish intensifies through time (Neusius 1986; Styles 1986). The lack of a well-preserved faunal assemblage at the Strong site has not permitted the fulfillment of our stated goals of providing data on Archaic period faunal subsistence patterns prior to the Late Archaic period, evaluating and/or refining the faunal exploitation models developed for the Late Archaic period in the American Bottom region, or contrasting Archaic period faunal exploitation patterns between the floodplain and adjacent uplands.

Archaeobotanical remains in the form of charred plant parts such as nutshell, seeds, and wood charcoal provide another means of addressing the subsistence pursuits of the site's inhabitants. Archaeobotanical studies have benefitted most from the implementation of systematic flotation sampling and the development of quantitative archaeobotanical analysis techniques that allow for the recovery and study of small-scale plant remains (e.g., Hastorf and Popper 1988; Miller 1988; Pearsall 1989; Wagner 1988). Such analyses have resulted in major advances in the interpretation of diachronic change in plant procurement strategies, including the growing role of humanly manipulated plant taxa during the Archaic period that would culminate centuries later in the fully agricultural adaptations of the Mississippian period. Furthermore, archaeobotanical analyses also may provide information that can be brought to bear on the issues of site function, seasonality of occupation, habitat preference, and diversity of diet, which in turn can be used in exploring patterns of prehistoric plant exploitation on both local and regional scales of analysis.

While the faunal assemblage offers little to advance our interpretation of the subsistence base of the Middle Archaic period inhabitants at the Strong site, the archaeobotanical assemblage, in contrast, does allow interpretations to be made regarding patterns of plant exploitation. Soil samples from 23 of the pit features excavated at the Strong site, a 35 percent sample totaling 270 liters of soil, were subjected to detailed archaeobotanical analysis. This processing and analysis produced an archaeobotanical assemblage composed of 24,749 fragments weighing 297.9 g. As summarized in Chapter 6, this assemblage is dominated by charred nutshell, which accounts for 96.7 percent of the assemblage by count and 97.4 percent by weight. Hickory nutshell, predominantly thick-shelled varieties, dominates the nutshell assemblage, which also includes minor amounts of thin-shelled hickories and black walnut. Acorn is nearly absent from the nutshell assemblage. Other than nutshell, the assemblage consists of wood charcoal, which comprises only 3.18 percent of the assemblage by count, and 30 charred seeds or seed fragments that account for a mere .12 percent of the total archaeobotanical remains within the analyzed sample. The seeds include those of the aquatic American lotus, *Nelumbo lutea*; wild grape, *Vitis* sp.; rush, *Scirpus* spp.; and a wild morph of chenopod, *Chenopodium* sp. The majority of the recovered seeds, however, were too badly charred or fragmented to be identified accurately.

The predominance of hickory nutshell within the Strong site assemblage should not obscure the contributions of a wide range of plant products to the Middle Archaic period diet. The presence of thin-shelled hickory and American lotus remains within the sampled pits is indicative of the exploitation of both floodplain forest and backwater lake habitats by the site's inhabitants. It is likely that additional floodplain taxa were gathered or collected during the Middle Archaic period on a seasonal basis but were not subjected to processing or depositional situations that favored their preservation. Similarly, additional upland forest and prairie species likely were utilized without leaving an archaeological trace.

The manner in which the hickory nuts were used at the site is not entirely clear. Few pitted cobbles or nutting stones are present in the lithic assemblage. The lack of significant numbers of such tools, however, may be explained partially by the large number of locally available chert hammer and anvil stones that may have been used to open the nuts. The role of the pit features in nut processing or storage also remains to be elucidated. The uniformity of the subsurface pits, both in morphology and content, suggests that their intended function was similar throughout the occupation of the site. No significant indications of in situ burning were present, nor was fire-cracked rock a major component in the fill. This would seem to argue against these features functioning as roasting or cooking pits. It may be that the pits were used as storage facilities for fall hickory nut crops which could be opened on an as-needed basis throughout the following winter and spring. Following this use, these pits then would be infilled with site debris and soil. Alternatively, they could have functioned as facilities for hot stone boiling, an effective means of processing nuts for their oils.

Overall, the subsistence remains from the Strong site and the contexts from which they were recovered point to the utilization of the site as a temporary, limited-focus residential extractive camp most likely geared toward the collection of two important resources, chert from the bluff-face outcrops and hickory nuts from the bluff-crest forest. The exploitation of the adjacent bottoms is indicated by the presence of thin-shelled hickory, a component of mesic floodplain forest habitats, and seeds of the aquatic American lotus, both of which could represent stored resources. As such, the Strong site subsistence remains are very similar to those recovered from Middle Archaic sites in similar environmental settings and represent the employment of a targeted resource procurement strategy that relies on logistical rather than residential group movements.

Specifically, the Strong site subsistence data indicate that the remains present within the excavated features are in line with those recovered from Nochta and Modoc Rock Shelter in as much as all of these assemblages point to a heavy reliance on hickory nuts regardless of their position on the landscape. The prevalence of this resource has formed the basis for the classification of Strong and Nochta as extractive camps where nut collection was one of the primary activities undertaken during the occupation of these sites. Modoc Rock Shelter provides a complimentary data set which, while compositionally similar in terms of floral resources present in Middle Archaic strata, represents the accumulation of subsistence debris in a more intensively occupied base camp setting. Importantly, the Modoc Rock Shelter data indicate the growing importance of aquatic resources, principally slack water species of fish, during the Middle Archaic period. The growing importance of aquatic resources at Modoc during a time when the site functioned as a Middle Archaic base camp is in contrast, however, to data from Koster, which suggest a growing focus on deer during periods of occupational intensification (Styles et al. 1983:290–291). Unfortunately, neither the Strong nor Nochta assemblages contain significant faunal components that can be compared with the Modoc data to evaluate changes in faunal exploitation patterns that are likely correlated with increasingly specific patterns in plant usage.

In summary, the Strong site subsistence data are in agreement with documented trends in more selective patterns of plant exploitation during the Middle Archaic which focus on the acquisition of seasonally available resources, principally hickory nuts, as important components of logistically oriented subsistence/settlement systems operating in the riverine midcontinent.

Settlement System

The nature of the settlement system within which the Strong site was but a single component is potentially the most difficult issue to address given the data at hand. Clearly, any attempt at reconstructing a system of interrelated, functionally differentiated, and temporally contemporaneous sites from data generated from a single site is fraught with uncertainty and has resulted in often conflicting settlement systems models (Brown 1986:325–326). Despite the difficulties inherent in such an attempt, the judicious use of available contextual data, including environmental conditions, temporal placement of other Middle Archaic sites, subsistence data, technological information, and site survey data, can be brought to bear on the delineation of a Middle Archaic settlement system that included the Strong site during the Dennis Hollow phase (6900–6500 B.P.) in the southern American Bottom region. On a more general level, studies such as Binford's (1980) classification of settlement system types as either based on residential or logistical movements of population and Cleland's (1976) evolutionary approach of categorizing prehistoric adaptations on a continuum from focal to diffuse based on the breadth of resources exploited, provide contexts within which to begin to explore the nature of Archaic period settlement systems in a meaningful manner.

As discussed earlier in Chapter 3, the Archaic period is one characterized by dynamic directional change in patterns of site location, intensity and length of occupation of certain site locales, changes in resource procurement strategies, growing evidence of extraregional exchange, and most likely increasing population density and aggregation in highly productive environmental zones. The utility of regional approaches to the issues of Archaic period settlement systems has been demonstrated by earlier research (Brown and Vierra 1983; Emerson et al. 1986; Fowler 1959; Winters 1969). Regional approaches permit both synchronic interpretations of the various components of a given settlement system and the analysis of diachronic change within or between regions that results from adaptive responses to environmental, technological, and sociopolitical conditions. In terms of the Binfordian model, the Archaic period is one in which human populations evidence a change from the foraging of evenly distributed resources using residential mobility, to one in which resources that are often unevenly distributed across the landscape or seasonally limited in availability are collected through a series of logistically organized moves involving a broader range of site types. Site types expected for societies engaging in a logistically based collection system include residential base camps, extractive locales, field camps, caches, and stations. These various site types should be recognizable archaeologically by characteristic patterning in artifact and feature density, diversity of material assemblages and range of feature types represented, subsistence remains, and the physiographic position of the site.

Based on a variety of data generated from archaeological sites in southwest Illinois and the riverine midcontinent, the adoption of logistically organized collecting strategies is a process that apparently had its origins in the Middle Archaic period and was fully operationalized by the succeeding Late Archaic period. The Late Archaic is characterized by growing sedentism and population density, increasing social complexity and status differentiation, long distance exchange networks, and intensifications in horticultural activities (Brown 1985; Emerson and McElrath 1983; Emerson et al. 1986; Jefferies 1995; McElrath 1986; Styles et al. 1983). The adoption of logistically based resource procurement strategies during the mid-Holocene is reflected in the Middle Archaic occupations at Modoc Rock Shelter. At Modoc use of the site intensified from one characterized by short term occupations, interspersed with longer periods of residency before 7500 B.P., to one of longer term residential occupancy where a greater range of activities were taking place (Ahler 1993; Styles et al. 1983). Similarly, at the Koster site, occupations dating to the pre-7600 B.P. Middle Archaic 1 (8300–7600 B.P.) phase are generally diffuse and of limited diversity when compared to the succeeding Middle Archaic 2 (7300–6850 B.P.) and Helton (5800–4900 B.P.) phase occupations. The latter include evidence of structures, human burials, and a wide array of material classes and activity areas resulting from the use of the site as a residential base camp (Brown and Vierra 1983). Similarly, the Middle Archaic Black Earth site in southeastern Illinois is indicative of intensive, long-term occupation of a former lake-edge habitat within the Saline River valley by a large population that undertook a broad range of activities at the site (Jefferies and Butler 1982). The Black Earth assemblage suggests that Middle Archaic populations in southeastern Illinois were aggregating in ecologically diverse lake-margin habitats, which are analogous to the highly productive floodplains of the lower Illinois and Mississippi river valleys.

While the Middle Archaic occupations at Black Earth, Koster, and Modoc Rock Shelter are indicative of a general Archaic period trend toward lengthening periods of site occupancy, increasing internal complexity, and growing aggregations of population in large base settlements, ancillary sites such as extractive camps or field camps that were functionally affiliated with these large base camps are comparatively rare in the known archaeological record. Recent excavations, however, have provided several examples of limited activity sites in both the lower Illinois River valley and American Bottom that begin to fill in the gaps in Middle Archaic settlement systems. In the lower Illinois River valley, limited-activity sites include upland nut processing sites such as Buckshaw Bridge and Elledge where bulk oil extraction appears to have been the primary task, and floodplain sites like Slim Lake, School 48, and Burr Lake where aquatic resources were likely the targets of the residents. Hickory nuts available in the uplands are also well-represented among the subsistence remains at these floodplain sites, suggesting that these sites were tied functionally to larger, more permanent base camps located within easy access of both the uplands and floodplains of the lower Illinois River (Stafford 1991). In the American Bottom, the Middle Archaic component at the Nochta site represents a limited-activity floodplain encampment, likely a seasonally occupied field camp, from which a discrete and limited range of activities was undertaken. Hickory nutshell accounts for about 55 percent of the nutshell recovered from Middle Archaic pits at the site, and seeds are poorly represented (Simon 1990).

The upland Strong site discussed here also reflects a relatively restricted range of activities, likely oriented toward fall nut crops and obtaining readily available cherts from the adjacent bluff. The existence of these two Middle Archaic sites indicates an adaptation similar to that proposed for the Middle Archaic in the lower Illinois valley with resource exploitation and settlement location organized along the lines of logistically organized population movement, and attests to the gradual appearance of logistically organized foraging and collecting strategies during the Middle Archaic that would come to define Late Archaic adaptations in the midcontinent several millennia later.

The mechanisms responsible for the appearance of logistically organized settlement systems during the Middle Archaic likely include alterations in both the natural and sociopolitical environments. The appearance of logistical solutions to scheduling represents a gradual rather than abrupt transformation. Environmental factors favoring a logistical pattern of settlement include, but should not be limited to, alterations in the mid-Holocene environment resulting from the Hypsithermal Interval (but see Emerson et al. 1986 for an alternative view). Geoarchaeological and geomorphological studies have demonstrated increases in sedimentation rates in colluvial fan settings in many river systems that are believed to have resulted from changes in the density and type of vegetational cover in the adjacent uplands that favored more active erosion (Bettis and Hajic 1995). Concomitant with the proposed upland deterioration, the major river systems began to take on a more modern character, with the evolution of highly productive backwater aquatic habitats such as swamps and lakes that formed as a result of the aggradation of eroding upland sediments caused by altered flow regimes. The effects of upland desiccation would be mitigated, however, in the highly dissected, forested valley slopes and margins which likely suffered little obvious deleterious effect (Asch et al. 1972: 20–24). Together, the growing productivity of floodplain habitats and potential degradation of upland resources would have made exploitation of the river valleys more attractive to human population, resulting in increasing population density in the major river valley and valley margin settings (Brown and Vierra 1983). Utilization of the uplands also shows an apparent decrease during the Middle Archaic period (Ahler 1984; Carmichael 1977; Emerson et al. 1986), although this lower frequency of upland sites cannot be completely correlated with increases in valley bottom settlement during the same period. Instead, settlement of the uplands focused on the bluff crest along the valley margin.

The sociopolitical context of the Middle Archaic period also plays a role in the evolution of logistical settlement systems. With larger and more sedentary aggregations of populations in highly productive environmental settings, access to resources becomes more competitive and mobility options are limited. As resource procurement territories become restricted due to a larger number of competing interests and mobility-based mechanisms of lessening social risks are limited, intensified resource production is required to maintain an increasing population. In situations where resources are not equally available, increasing sedentism offers a means to lessen social conflicts over scarce or seasonally available resources (Brown 1985). The evolution of highly productive aquatic and riverine habitats in major midcontinental drainage systems during the Holocene, combined with some degree of upland degradation and lessened productivity due to the Hypsithermal, provides the necessary impetus for the evolution of increasingly sedentary populations during the Archaic period in localized, ecologically diverse and productive settings such as the American Bottom.

On the basis of the available evidence, it is postulated that the Strong site functioned as a residential extractive camp (Emerson et al. 1986:251) within the Middle Archaic period Dennis Hollow phase settlement system. As a residential extractive camp, Strong served as a point from which to collect and process hickory nuts during the fall and also allowed easy access to lithic raw materials which outcrop in Dennis Hollow a few hundred meters to the south and west. The homogeneity of pit features present at the site (which are considered to have functioned as either storage pits or facilities for bulk nut oil extraction by hot stone boiling), the relative lack of diversity in the formal tool assemblage, the abundance of chert debris, and the limited subsistence remains all indicate the function of the site as a residential extractive camp. The larger system likely was composed of a number of interrelated sites in various physiographic and environmental settings in the American Bottom region from which a number of subsistence and raw material needs could be satisfied. This system is expected to include both upland and floodplain sites in addition to sites in valley margin or tributary valley settings. Excavated Middle Archaic components at Nochta, a floodplain specialized camp, and Modoc Rock Shelter where a series of Middle Archaic residential camps are present after 7200 B.P., are illustrative of the type of sites that can be expected to have comprised the Dennis Hollow phase settlement system.

Conclusions: The Dennis Hollow Phase Defined

The Phase III mitigation of 11MO841 has, for the most part, achieved all of its goals. Of initial importance was the recovery of all archaeological materials from intact deposits prior to the construction of infrastructure and buildings in Addition 2 of the Valmeyer relocation parcel. The use of heavy machinery to remove disturbed plow zone deposits allowed the definition of 66 prehistoric features during the Phase III investigations. In addition, three features were excavated at 11MO841 during the Phase II portion of this project, yielding a total of 69 known features from this site. The definition and mapping of these features allowed the collection of spatial data while their excavation resulted in the recovery of radiocarbon samples, soil samples, and artifacts. These items then were processed and analyzed, the results of which led to the achievement of the second set of goals, placing those results into a local and regional context. The data recovered during the Phase III mitigation of the site allowed the investigation of four of the five broadly conceived areas of research proposed for the site: chronology, site function, subsistence, and settlement system analysis. Only data pertaining to the use of the sinkhole proved disappointing in that all materials located in this geologic feature were deposited by Historic period erosion.

Of foremost importance is the definition of the broad parameters of a previously unidentified Middle Archaic period phase for the southern extreme of the American Bottom region, here designated the Dennis Hollow phase. Two lines of evidence are essential underpinnings of this phase: a suite of tightly clustered radiocarbon dates and a newly defined projectile point type, Valmeyer Corner Notched. The radiocarbon dates form a surprisingly tight cluster between 6900 and 6500 B.P. given that the dated features form a spatially diverse sample. This range predates that for the previously defined Nochta phase (Higgins 1990). Associated as the predominant diagnostic artifact is the newly defined Valmeyer Corner Notched projectile point. While comparisons have identified similarities to other defined point types, differences in attributes are also apparent. Valmeyer Corner Notched projectile points appear to represent a stage in the continuum of point styles that unites the Archaic period.

Based on the recovered material and subsistence remains as well as the features, it is posited that the Strong site functioned as a residential extractive locale within a larger settlement system. Of primary importance in the occupation of this locale were the harvesting and processing of nuts for their oils and the collection of chert nodules and their subsequent reduction into biface blanks and preforms that were then transported and used off site. Other tasks were conducted at 11MO841 as evidenced by the numerous projectile points recovered as well as the large expedient tool assemblage. Clearly, the nature and context of these other activities were embedded within the overall occupational strategy of nut procurement and processing and lithic collection and reduction.

To date, no other site in the vicinity is known to have both a preponderance of Valmeyer Corner Notched projectile points and associated radiocarbon dates contemporaneous with those of the Strong site. Points similar to the Valmeyer Corner Notched type were recovered at Modoc Rock Shelter but do not comprise a majority. Not only are we as yet unable to define the spatial extent of the Dennis Hollow phase, but the number, location, and type of component sites comprising the contemporaneous settlement system remain unknown. It is likely that the settlement system, of which the Strong site forms but a single component, is consistent with the emergence of a logistically organized foraging and collecting system.

And so it is the nature of scientific inquiry that additional questions are raised with the conclusion of a particular phase of research. The current project has identified the broad parameters of a previously undefined Middle Archaic period phase, Dennis Hollow, in the southern part of the American Bottom. A temporal range and associated projectile point type have been designated for this phase. A site function and potential role within a hypothetical settlement system have been proposed. Whether the contemporaneous settlement system had characteristics more indicative of a collector or forager strategy is unknown, and given that the transition from one settlement system archetype to another is a process, either or neither could characterize the Dennis Hollow phase settlement system. Indeed, a more complete understanding of the nature of the Dennis Hollow settlement system is more than a mere exercise in typology. A foundation as basic as this has an impact on resolving issues concerning the impact of the Hypsithermal Episode on Archaic period populations and adaptations and on the nature and cause of increases in cultural complexity in the American Bottom that culminated, thousands of years after the occupation of the Strong site ceased, in the Mississippian chiefdom of Cahokia. But, as the truism goes, it is dependent upon additional research to resolve these issues.

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APPENDIX A.

FEATURE ATTRIBUTES

APPENDIX A.
FEATURE ATTRIBUTES

Class I Pits

Feature	Length	Width	Depth	L/W Ratio
4	0.94	0.83	0.44	1.133
5	0.9	0.77	0.25	1.169
7	0.94	0.82	0.22	1.146
8	0.66	0.66	0.21	1
9	1.07	1.02	0.24	1.049
11	0.66	0.62	0.12	1.065
12	0.85	0.82	0.28	1.037
13	0.88	0.78	0.23	1.128
14	0.83	0.74	0.29	1.122
16	0.9	0.85	0.4	1.059
17	0.74	0.64	0.13	1.156
18	0.9	0.85	0.28	1.059
19	0.85	0.8	0.19	1.063
21	1.08	1	0.08	1.08
22	0.85	0.85	0.23	1
23	0.83	0.61	0.21	1.361
24	1.07	0.85	0.21	1.259
25	0.98	0.71	0.25	1.38
26	1.19	0.95	0.2	1.253
28	1.02	0.98	0.23	1.041
29	0.53	0.42	0.18	1.262
30	1.1	0.96	0.22	1.146
31	0.82	0.8	0.2	1.025
32	0.75	0.68	0.15	1.103
33	0.88	0.6	0.18	1.467
35	0.69	0.43	0.11	1.605
36	0.93	0.89	0.3	1.045
37	0.78	0.6	0.1	1.3
38	1.14	1.03	0.15	1.107
40	0.97	0.94	0.56	1.032
41	0.89	0.72	0.27	1.236
42	0.9	0.73	0.17	1.233
43	0.65	0.63	0.12	1.032
44	0.95	0.85	0.7	1.118

APPENDIX A.
FEATURE ATTRIBUTES

Class I Pits Continued

Feature	Length	Width	Depth	L/W Ratio
45	1.03	0.97	0.41	1.062
46	0.64	0.55	0.13	1.164
47	0.85	0.81	0.22	1.049
48	0.8	0.65	0.25	1.231
49	0.85	0.67	0.29	1.269
50	0.6	0.55	0.13	1.091
51	1.01	0.97	0.25	1.041
52	0.94	0.72	0.2	1.306
56	1.1	0.95	0.46	1.158
57	0.65	0.57	0.29	1.14
59	0.77	0.69	0.48	1.116
62	0.93	0.76	0.3	1.224
63	0.93	0.93	0.34	1
64	1	0.85	0.23	1.176
66	0.8	0.79	0.17	1.013
68	1.05	0.9	0.18	1.167
69	0.55	0.42	0.06	1.31
70	0.87	0.82	0.47	1.061
71	1.37	1.17	0.2	1.171
72	0.69	0.61	0.1	1.131
73	0.75	0.74	0.1	1.014
74	0.9	0.76	0.31	1.184
75	0.9	0.85	0.15	1.059
77	0.9	0.7	0.3	0.286

APPENDIX A.
FEATURE ATTRIBUTES

Class II Pits

Feature	Length	Width	Depth	L/W Ratio
6	0.87	0.82	0.3	1.061
10	0.92	0.9	0.3	1.022
15	0.74	0.63	0.26	1.175
20	0.65	0.55	0.22	1.182
27	1.15	1.1	0.39	1.045
39	1.08	0.99	0.27	1.091
55	0.73	0.66	0.5	1.106
61	0.75	0.72	0.31	1.042

Note: All measurements are in meters; L=length; W=width.

APPENDIX B.

LITHIC ARTIFACTS

APPENDIX B.
LITHIC ARTIFACTS

	FEATURE 4		FEATURE 5		FEATURE 6		FEATURE 7		FEATURE 8		FEATURE 9		FEATURE 10		FEATURE 11		FEATURE 12		FEATURE 13		FEATURE 14	
	N	W(g)	N	W(g)	N	W(g)	N	W(g)	N	W(g)	N	W(g)	N	W(g)	N	W(g)	N	W(g)	N	W(g)	N	W(g)
CHERT TOOLS																						
Rough biface																						
Thick biface																					1	70.9
Thin biface			1	4.6			1	0.5	1	11.7			4	7.5								
End scraper																						
Retouched flake																						
Retouched blade													1	35.9								
Bifacial scraper		1	3.4																			
Perforating tool		1	0.4																			
Projectile point/knife		1	2.2																			
Hammerstone			1	307.6			1	64.6														
Wedge																						
TOTAL			5	318.2			2	65.1	1	11.7			5	43.4							1	70.9
CHERT DEBITAGE																						
Planoconvex core			1	279.7																		
Multidirectional core			2	187									1	54							1	164.7
Bipolar core											1	46.2	2	162.1					2	311.6	1	76.5
Other type core							1	14.9														
Primary flake			5	15.6	2	10					6	14.8	28	76.1			1	18.1	5	10.9	4	17.1
Secondary flake			11	75.9	3	6.3	7	49.2	2	0.2	8	18.7	50	314.8			4	34.3	11	57.8	9	44.3
Tertiary flake	9	7.7	48	97.8	43	88.4	16	33.7	6	0.2	24	32.4	77	115.9	4	17.5	9	8.2	6	2.5	18	17.4
Bifacial thinning flake	1	9.5	6	4.8	5	2.1	1	0.1			4	3.2	8	7.6	2	0.4			1	0.3		
Bipolar flake			9	6.9	3	1.4	1	1.3			5	3.7	24	129.1			1	0.4			2	1.9
Broken flake	23	26	102	62.3	119	83.8	31	26.1	12	9.5	54	73	170	179.6	5	2.8	13	38	22	65.8	25	31.6
Blade	2	1.1	1	0.1	4	13.3					3	1.6	5	5.4					2	10.5		
Shatter	14	9.6	129	924.1	59	156.4	76	255.3	35	108.3	197	746.2	245	1154.8	15	72.8	35	31.3	41	56.7	48	161
Chert chunks									1	163.9												
TOTAL	49	53.9	314	1654.2	258	361.7	133	380.6	56	282.1	302	939.8	610	2199.4	26	93.5	63	130.3	90	516.1	108	514.5
NONCHERT ARTIFACTS																						
Ground sandstone																						
Hammerstone					1	152							1	477.1								
Pitted cobbles																						
Mano																						
Metate																						
Celt																	1	399				
Abrader																			1	42.9		
Axe																						
TOTAL					1	152							1	477.1			1	399	1	42.9		
MISCELLANEOUS MATERIAL																						
Hematite/ochre					2	1.1											1	0.7	1	0.5		
Limestone	1	0.2	16	19.6	9	11.2	8	224.6	1	10	165	1520.2	71	341.3			7	4.9	3	72.6	6	38.3
Fire-cracked rock					2	74.6	2	32.3			2	85.9	40	290.1			1	0.3			1	2.7
Pebbles			1	0.9			3	55.9			3	1.6									9	4.9
Sandstone	1	0.4	4	8	4	8.3															1	23.5
Igneous cobble			6	7.8									1	2400								
Unworked cobble																				1	169.3	
Granite			1	0.5																		
Peridotite cobble																						
Missouri clinker																						
TOTAL	2	0.6	28	36.8	17	95.2	13	312.8	1	10	170	1607.7	112	3031.4			9	5.9	4	73.1	18	238.7
PAGE TOTAL	51	54.5	347	2009.2	276	608.9	148	758.5	58	303.8	472	2547.5	728	5751.3	26	93.5	72	136.2	95	632.1	127	824.1
Utilized flakes							1						2								1	

APPENDIX B.
LITHIC ARTIFACTS

	FEATURE 15		FEATURE 16		FEATURE 17		FEATURE 18		FEATURE 19		FEATURE 20		FEATURE 21		FEATURE 22		FEATURE 23		FEATURE 24		FEATURE 25	
	N	W(g)	N	W(g)	N	W(g)	N	W(g)	N	W(g)	N	W(g)	N	W(g)	N	W(g)	N	W(g)	N	W(g)	N	W(g)
CHERT TOOLS																						
Rough biface			2	26 6															1	7.7		
Thick biface																					1	5 1
Thin biface			2	2 2			1	0 8									1	4 5				
End scraper																						
Retouched flake											1	1.7										
Retouched blade																						
Bifacial scraper																						
Perforating tool																						
Projectile point/knife			1	21 5			1	7														
Hammerstone			1	258									1	152 8								
Wedge																						
TOTAL			6	308 3			2	7 8			1	1 7	1	152 8			1	4 5	1	7 7	1	5 1
CHERT DEBITAGE																						
Planoconvex core		1	46 8																			
Multidirectional core	1	52 2						1	35.7	1	60 4			2	119			1	46 5			
Bipolar core			1	75 9			3	607 5	2	414.8	1	186.4	1	189								
Other type core																						
Primary flake	2	5 3	11	22 8		12	65 8	2	32 9	3	2 6			4	39 3	4	3 9	2	9.1	4	6 2	
Secondary flake		14	54 1			11	81 6	2	11 5	8	75 8			6	26 3	5	23 1	9	86 8	5	15.3	
Tertiary flake	10	3 8	58	80 5	2	5 1	12	40 3	1	0 4	16	10 6	6	22 6	13	27 7	13	54 5	11	10 2	12	63.1
Bifacial thinning flake	1	0 1	5	2 4							1	2 1			2	1 7	1	0 4	3	2 3		
Bipolar flake			13	68 5	1	0 3	4	79 4			4	89 4			2	4 2	1	0 4	2	4 1		
Broken flake	35	29 4	67	111 4	2	0 2	47	49 5	17	9 5	38	156	15	11 9	25	24	35	20 6	27	29 5	19	17 8
Blade	2	17 5	8	17	1	5 9	2	4 1	1	9.9	2	10.3	1	0 5	1	1.1	1	0 8	1	0 1		
Shatter	70	908 5	219	834 4	4	13 4	68	628 4	29	285.6	72	334.6	70	806 5	77	328 4	41	263	32	67.1	54	194 9
Chert chunks													5	2154 7	1	50.5						
TOTAL	121	1016 8	397	1303.7	10	24 9	159	1556.6	55	800.3	146	928.2	98	3185.2	133	622.2	101	366 7	88	255 7	94	297 3
NONCHERT ARTIFACTS																						
Ground Sandstone																						
Hammerstone			1	168 5	1	412 8			1	353 6												
Pitted Cobbles																						
Mano									1	312												
Celt																						
Metate																						
Abrader																						
Axe																						
TOTAL			1	168 5	1	412.8			2	665.6												
MISCELLANEOUS MATERIAL																						
Hematite/ochre															1	1.1						
Limestone	10	11.5	46	305 8			39	71.7	6	6.1	3	5	8	15 1	8	28.3			6	48	64	126 6
Fire-cracked rock	1	19.7	6	81.5	1	16.9			4	2.2			1	190.7					1	234.3		
Pebbles	9	7.4	1	3.1			8	2 3	2	24.5			1	0 9	1	0.1					2	10 4
Sandstone	1	8.2	2	29			1	0 1	1	0.5	15	330.3	1	182.2					1	12 8		
Igneous cobble																						
Unworked cobble		3	172.4										1	458 2								
Granite																						
Peridotite cobble																						
Missouri clinker																						
TOTAL	21	46.8	58	591.8	1	16.9	48	74.1	13	33.3	18	335.3	12	847 1	10	29.5			8	295 1	66	137
PAGE TOTAL	142	1063.6	462	2372.3	12	454.6	209	1638.5	70	1499.2	165	1265 2	111	4185.1	143	651.7	102	371.2	97	558 5	161	439 4
Utilized flakes			3				2				1		1		1							

APPENDIX B
LITHIC ARTIFACTS

	FEATURE 26		FEATURE 27		FEATURE 28		FEATURE 29		FEATURE 30		FEATURE 31		FEATURE 32		FEATURE 33		FEATURE 34		FEATURE 35		FEATURE 36	
	N	W(g)	N	W(g)	N	W(g)	N	W(g)	N	W(g)	N	W(g)	N	W(g)	N	W(g)	N	W(g)	N	W(g)	N	W(g)
CHERT TOOLS																						
Rough biface																						
Thick biface																						
Thin biface																					1	2
End scraper																						
Retouched flake											1	33										
Retouched blade																						
Bifacial scraper																						
Perforating tool	1	2.3			1	10.7					1	4.3									1	2.9
Projectile point/knife					1	4.5					1	1.3										
Chert hammerstone					1	1681.3															1	338.6
Wedge																						
TOTAL	1	2.3			3	1696.5					3	38.6									3	343.5
CHERT DEBITAGE																						
Planoconvex core																						
Multidirectional core	2	179.9	1	68.1	1	90.5			4	335.9	1	158.8	1	46.2					1	70.1		
Bipolar core					1	208.5															1	44.4
Other type core																						
Primary flake	10	60.5	4	2.4	15	109.1	4	19.5	10	63.6	3	13.2	1	0.1	1	1.3			1	1	10	122.2
Secondary flake	12	61.6	7	18.2	15	75.6	5	21.2	24	186.8	3	6.6			2	6.4	2	17.7	4	26.9	20	140.4
Tertiary flake	21	27	14	27	30	28.4	10	21.7	33	62.8	16	32.1	9	12.4	6	25.5	3	5.7	3	9	38	62.5
Bifacial thinning flake					2	0.9					2	2.1	1	0.3	1	0.2						
Bipolar flake			2	0.3	6	30.4	3	23.5	2	9.4			2	6.7			1	4.9	1	0.4	6	37.4
Broken flake	42	41.2	26	24.8	69	45.3	11	21.2	60	51.2	21	41	6	1.1	13	6.8	1	0.3	4	10.8	87	166.8
Blade	1	0.7							2	12.6					2	3.9	1	0.5			4	10.2
Shatter	153	594.5	53	165	208	1135	22	290.5	236	754.5	57	176.8	7	4.1	26	147.7	8	64.3	13	60	147	770.3
Chert chunks					2	291.7			3	1310											2	238.6
TOTAL	241	965.4	107	325.8	349	2015.4	55	397.6	374	2786.8	103	430.6	27	70.9	51	191.8	16	93.4	27	178.2	315	1592.8
NONCHERT ARTIFACTS																						
Ground sandstone																						
Hammerstone			1	349.3					2	1201	1	464.2										
Pitted cobbles																						
Mano																						
Metate	1	796.5																				
Celt																						
Abrader																					1	85.1
Axe																						
TOTAL	1	796.5	1	349.3					2	1201	1	464.2									1	85.1
MISCELLANEOUS MATERIAL																						
Hematite/ochre					1	4.9					1	0.4										
Limestone	6	15.8	5	8.6			1	1.1	6	36.2	21	80	8	7.1	17	198.5	1	7.9				
Fire-cracked rock			2	35.5	6	123.6	1	2.3			3	12.3									4	157.8
Pebbles	3	2.5	1	0.3	6	66.5			4	5	1	9.4			2	2.2					1	0.7
Sandstone							2	42.5	4	15.2	1	0.9	1	1.4							1	59.3
Igneous cobble																						
Unworked cobble																						
Granite																						
Peridotite cobble																						
Missouri clinker																						
TOTAL	9	18.3	8	44.4	13	195	4	45.9	14	56.4	27	103	9	8.5	19	200.7	1	7.9			6	217.8
PAGE TOTAL	252	1782.5	116	719.5	365	3906.9	59	443.5	390	4044.2	134	1036.4	36	79.4	70	392.5	17	101.3	27	178.2	325	2239.2
Utilized flakes			1								1										3	

APPENDIX B.
LITHIC ARTIFACTS

	FEATURE 37		FEATURE 38		FEATURE 39		FEATURE 40		FEATURE 41		FEATURE 42		FEATURE 43		FEATURE 44		FEATURE 45		FEATURE 46		FEATURE 47	
	N	W(g)	N	W(g)	N	W(g)	N	W(g)	N	W(g)	N	W(g)	N	W(g)	N	W(g)	N	W(g)	N	W(g)	N	W(g)
CHERT TOOLS																						
Rough biface																						
Thick biface																					1	13.1
Thin biface															1	5.1	2	5.8			1	0.7
End scraper																						
Retouched flake													1	32.7								
Retouched blade																						
Bifacial scraper																						
Perforating tool																						
Projectile point/knife					1	2.4											3	7			1	7.4
Chert hammerstone																	2	35.7				
Wedge					1	52.9																
TOTAL					2	55.3							1	32.7	1	5.1	7	48.5			3	21.2
DEBITAGE																						
Planoconvex core					2	223.1	1	51			1	21.7										
Multidirectional core	3	99.4	2	283.5			1	96					1	90	1	65.3			1	14.2	2	30.1
Bipolar core			2	60.8			1	44.4							1	13.6						
Other type core																						
Primary flake	2	33.5	9	79.9	16	41.3	7	18.1	2	10.7	64	105.9			12	55.6	7	48.4			16	120.7
Secondary flake	3	11.8	18	96	26	129.7	21	158.7	5	4	68	104.8	4	21	3	10.9	14	104.9			11	35
Tertiary flake	4	16.6	19	30.2	163	115.9	64	112.5	11	12.7	233	314.3	6	1.7	22	69.4	37	101.1	2	0.2	28	28.9
Bifacial thinning flake					46	14.3	3	1.2	3	2.5			7	3.3	8	2.1	2	0.7				
Bipolar flake					5	3.2	4	12.2	1	42.2	7	41.7									2	11.4
Broken flake	10	5	36	111.5	300	215.2	55	35.5	27	25.7	290	144.2	5	0.5	47	16.6	36	29.9	5	7.9	39	29.3
Blade					11	6.4	1	0.7			2	2.6					1	0.6			1	4.6
Shatter	23	120.1	103	571	403	1525.4	177	1084.7	35	382.3	334	925.6	28	216.5	195	539.2	130	514.7	15	11.1	88	571.9
Chert chunks	1	254.9	1	92.2					1	90					1	43					1	121.8
TOTAL	46	541.3	190	1325.1	972	2274.5	335	1615	85	570.1	999	1660.8	51	333	290	815.7	227	800.3	23	33.4	188	953.7
NONCHERT ARTIFACTS																						
Ground sandstone																						
Hammerstone			1	330.7			4	564.1													1	188
Pitted cobble																	1	387.4				
Mano																						
Metate																						
Celt																						
Abrader																						
Axe																						
TOTAL			1	330.7			4	564.1									1	387.4			1	188
MISCELLANEOUS MATERIAL																						
Hematite/ochre					1	0.6			1	0.3					5	2.3	1	0.2				
Limestone	6	0.7	6	7.6	27	111.1	16	84.8	3	0.6	21	57.9	15	86.9	2	303.8	14	17.5	5	7.4	18	100.5
Fire-cracked rock			1	26.3			2	198.1	1	1.3	2	9.7	2	3.3	3	15.2	1	1.2	5	115.9		
Pebbles			3	15.3	20	18.4	4	54.7			13	16.4			11	10.8						
Sandstone					5	13.8	3	13.2							1	1.3	2	19.5				
Igneous cobble							1	100														
Unworked cobble																						
Granite																						
Peridotite cobble																						
Missouri clinker					1	0.1																
TOTAL	6	0.7	10	49.2	54	144	26	450.8	5	2.2	36	84	17	90.2	22	333.4	18	38.4	10	123.3	18	100.5
PAGE TOTAL	52	542	201	1705	1028	2473.8	365	2629.9	90	572.3	1035	1744.8	69	455.9	313	1154.2	253	1274.6	33	156.7	210	1263.4
Utilized flakes			5		2		1								3		1				4	

APPENDIX B.
LITHIC ARTIFACTS

	FEATURE 48		FEATURE 49		FEATURE 50		FEATURE 51		FEATURE 52		FEATURE 55		FEATURE 56		FEATURE 57		FEATURE 59		FEATURE 61		FEATURE 62	
	N	W(g)	N	W(g)	N	W(g)	N	W(g)	N	W(g)	N	W(g)	N	W(g)	N	W(g)	N	W(g)	N	W(g)	N	W(g)
CHERT TOOLS																						
Rough biface																						
Thick biface													1	0.5								
Thin biface																					1	13.8
End scraper																						
Retouched flake							1	35.5														
Retouched blade																						
Bifacial scraper																						
Perforating Tool																			1	9.1		
Projectile point/knife												1	2									
Chert hammerstone																						
Wedge																						
TOTAL							1	35.5					2	2.5					1	9.1	1	13.8
DEBITAGE																						
Planoconvex core													1	175.5								
Multidirectional core							1	110.4			1	339	3	281.6								
Bipolar core											1	73.8	4	362			1	120.9	1	172.1		
Other type core													1	41.3								
Primary flake	1	13	4	5.1			4	21.4	4	5.2	3	5.7	24	207.8	3	3.6	1	3.3	3	4.1	4	9.6
Secondary flake	3	4.7	6	37.9			14	63	9	28.7	5	31.9	23	106.6	4	28.7	3	22.5	7	51.2	12	43.8
Tertiary flake	8	11.9	22	10.1	2	0.4	59	85	24	17.7	15	10.5	67	162.6	5	2	2	8.2	17	21	20	14.4
Bifacial thinning flake		1	1.2			1.2	2.5	4	1.2							1	1.9			6	2.4	
Bipolar flake	3	88.2							4	16.1			6	53.2					1	2		
Broken flake	22	25.4	44	32.5	5	18.6	81	33.8	34	16.8	19	34.4	113	170.6	14	10	8	13.1	25	32.6	60	67.4
Blade			1	1.2			1	8.5							1	2.7	1	1			4	4.5
Shatter	62	404.9	66	182.7	2	9.5	135	628.3	61	261.4	29	139	227	2177.9	50	361.4	26	182.1	93	1391.3	81	395.4
Chert chunks													1	540.7			1	467.3	1	41.2		
TOTAL	99	548.1	144	346.8	9	28.5	307	952.9	140	347.1	73	634.3	470	4279.8	77	408.4	44	820.3	148	1715.5	187	537.5
NONCHERT ARTIFACTS																						
Ground sandstone																						
Hammerstone													2	507.8			1	612.3	1	573.1		
Pitted cobble													1	317.8								
Mano																						
Metate																						
Celt																						
Abrader					1	56.3																
Axe																						
TOTAL					1	56.3							3	825.6			1	612.3	1	573.1		
MISCELLANEOUS MATERIAL																						
Hematite/ochre							3	3.1			1	0.6										
Limestone	2	18.8	1	0.9	1	1.4	23	57.2	7	66.9	62	656.1	223	893.3	14	110.2	2	19.6	2	2.8	14	31.8
Fire-cracked rock			2	0.8	1	43.2					1	2	1	388.6					3	31.2	3	83.6
Pebbles			1	0.4			5	1.8			2	0.5	25	48.9	1	2.5	1	2.7	6	14.2	1	2.8
Sandstone													2	3.1								
Igneous cobble																						
Unworked cobble													4	174.1								
Granite																						
Peridotite cobble					1	3090.9																
Missouri clinker											1	2										
TOTAL	2	18.8	4	2.1	3	3135.5	31	62.1	7	66.9	67	661.2	255	1508	15	112.7	3	22.3	11	48.2	18	118.2
PAGE TOTAL	101	566.9	148	348.9	13	3220.3	339	1050.5	147	414	140	1295.5	730	6615.9	92	521.1	48	1454.9	161	2345.9	206	669.5
Utilized flakes							2								1						1	

APPENDIX B.
LITHIC ARTIFACTS

	FEATURE 63		FEATURE 64		FEATURE 65		FEATURE 66		FEATURE 68		FEATURE 69		FEATURE 70		FEATURE 71		FEATURE 72		FEATURE 73		FEATURE 74	
	N	W(g)	N	W(g)	N	W(g)	N	W(g)	N	W(g)	N	W(g)	N	W(g)	N	W(g)	N	W(g)	N	W(g)	N	W(g)
CHERT TOOLS																						
Rough biface													2	736.4							2	280
Thick biface																					1	16.7
Thin biface			1	6.5																	5	12
End scraper									1	13.5												
Retouched flake																						
Retouched blade																						
BifacIAL scraper																						
Perforating tool																						
Projectile point/Knife	1	19																				
Chert hammerstone													1	166.4							2	181.6
Wedge																						
TOTAL	1	19	1	6.5					1	13.5			3	902.8							10	490.3
DEBITAGE																						
Planoconvex core																						
Multidirectional core			1	179.6															1	318.4	2	185.3
Bipolar core									1	46.3											2	238.1
Other type core																						
Primary flake			4	6.5									16	82.5	12	95.4					12	108.3
Secondary flake			8	79.2					4	18.7			51	537.4	28	77.3	5	33.1			30	291.4
Tertiary flake			24	41.6									116	183.8	40	43.9	1	1.8	3	8.5	44	80.8
Bifacial thinning flake									1	3.9			3	10							13	8.4
Bipolar flake			7	94.1					1	1.1			8	53.5	2	58.2						
Broken flake	1	2.4	39	17.8	1	0.4	1	0.4	12	7.7			272	202.3	84	82.2			5	2.6	126	169.3
Blade			2	1.7			1	2.4					4	1.5			12	14.9			3	0.8
Shatter			86	222.7	2	24.6	7	46	8	46.1	3	33.9	269	2447	109	921.2			6	442.4	210	1001.3
Chert chunk															4	3149.3			1	404.9	3	721.8
TOTAL	1	2.4	171	643.2	3	25	9	48.8	27	123.8	3	33.9	739	3518	279	4427.5	52	156	16	1176.8	445	2805.5
NONCHERT ARTIFACTS																						
Ground sandstone																						
Hammerstone																					3	1052.3
Pitted cobble																			1	375.4		
Mano																						
Metate																					1	129.9
Celt																						
Abrader																						
Axe																					1	1079
TOTAL																			1	375.4	5	2261.2
MISCELLANEOUS MATERIAL																						
Hematite/ochre																						
Limestone	4	51.8	3	1.1					1	24.2			25	228.2	96	101.9	5	16.6			39	312.7
Fire-cracked rock													3	21.2	12	163.5					3	109.6
Pebbles													25	121.5	2	0.1						
Sandstone																					9	68.9
Igneous cobble																						
Unworked cobble																						
Granite																						
Peridotite cobble																						
Missouri clinker													1	1.3							1	85.2
TOTAL	4	51.8	3	1.1					1	24.2			54	372.2	110	265.5	5	16.6			52	576.4
PAGE TOTAL	6	73.2	175	650.8	3	25	9	48.8	29	161.5	3	33.9	796	4793	389	4693	57	172.6	17	1552.2	512	6133.4
Utilized flakes			1										3		1						7	

APPENDIX B. LITHIC ARTIFACTS

	FEATURE 75		FEATURE 76		FEATURE 77		TEST UNIT I		EXCAV BL I		EXCAV BL II		EXCAV BL III		EXCAV BL IV	
	N	W(g)	N	W(g)	N	W(g)	N	W(g)	N	W(g)	N	W(g)	N	W(g)	N	W(g)
CHERT TOOLS																
Rough biface											3	261.4			1	90
Thick biface											9	171.3			4	334.4
Thin biface					1	3.8					4	26.4			8	74.8
End scraper															4	152.6
Retouched flake															4	53.9
Retouched blade																
Bifacial scraper																
Perforating tool									1	25.7					1	32.9
Projectile point/knife																
Chert hammerstn					1	38			1	129.7	10	1999.8				
Wedge											1	34.3			4	405.3
TOTAL					2	41.8			2	155.4	27	2493.2			28	1555.3
CHERT DEBITAGE																
Planoconvex core									1	80.7	1	93.4	1	159	1	28.6
Multidirectional core	1	37.7							7	981.1	47	4493.4	10	1120.7	20	2263.3
Bipolar core	1	74.2							1	159.5	15	1630.6	1	230.9	27	2837.2
Other type core											2	206.4	1	39.6	2	115.9
Primary flake	6	52.7	2	6.2	32	203.3	1	1.1	4	216.3	61	1450.4	15	470.5	54	2264.3
Secondary flake	8	23.1	1	0.2	41	185.5			9	179.1	95	1900.4	18	411.5	84	2357.6
Tertiary flake	3	13.1			84	125.1	2	1.3	13	97	78	677.1	22	165.5	31	392.7
Bifacial thinning flake			2	1.2	1	0.5	1	0.7	2	5.8	2	2.1			6	19.3
Bipolar flake	1	0.1			6	120.3					3	94	2	58.5	41	915.8
Broken flake	9	24.9			145	124.4	9	7.1	27	102	138	740	21	118	55	525.4
Blade					3	43.3					2	10.2	3	8.8	4	98.3
Shatter	25	61.8	4	39.3	333	1160.7	16	193.8	71	3081.2	595	18673.5	181	9857.4	496	18936.9
Chert chunk									2	530.5	51	10545.5	2	1076.5	26	8014.7
TOTAL	54	287.6	9	46.9	645	1963.1	29	204	137	5433.2	1090	40517	277	13716.9	847	38770
NONCHERT ARTIFACTS																
Ground sandstone															1	12.1
Hammerstone									1	202.1	10	3429	4	2646.7	39	14079
Pitted cobble															2	1062.3
Mano													1	518.5		
Metate																
Celt																
Abrader											1	18.7			4	215.8
Axe																
TOTAL									1	202.1	11	3447.7	5	3165.2	46	15369.2
MISCELLANEOUS MATERIAL																
Hematite/ochre					1	0.1					3	264.1			1	38.6
Limestone	3	6.9	2	21.6	32	306.1	25	16.1	11	239.4	79	1605.2	30	2798.8	103	3332.2
Fire-cracked rock					3	4.2			3	112.6	23	1695.6	15	1697.8	31	1670.3
Pebbles					20	19.3	11	10			3	19.1			5	76.5
Sandstone					1	108	1	3.7			15	1784.7	1	22	18	502.4
Igneous cobble											4	1912.5	4	793.4		
Unworked cobble					13	346.4					8	3130.9	6	2420.5	9	3718.1
Granite																
Peridotite cobble																
Missouri clinker									1	1.2						
TOTAL	3	6.9	2	21.6	70	784.1	37	29.8	15	353.2	136	10412.1	56	7732.5	167	9338.1
PAGE TOTAL	57	294.5	11	68.5	717	2789	66	233.8	155	6143.9	1264	56870	338	24614.6	1088	65032.6
Utilized flakes	1				5				4		33		7		33	

APPENDIX C.

CHERT RAW MATERIALS

APPENDIX C.
CHERT RAW MATERIALS

	FEATURE 5		FEATURE 10		FEATURE 16		FEATURE 18		FEATURE 22		FEATURE 28		FEATURE 36		FEATURE 39		FEATURE 45		FEATURE 47	
	N	W(g)	N	W(g)	N	W(g)	N	W(g)	N	W(g)	N	W(g)	N	W(g)	N	W(g)	N	W(g)	N	W(g)
CHERT TYPES																				
St Louis	1	3.4	18	58.0	2	12.4			4	73.0	3	11.2	6	8.5	14	70.8	3	1.6	1	6.6
Salem	146	961.4	384	1276.0	125	640.2	80	1183.7	76	90.8	216	1673.2	213	1338.9	349	1517.4	94	4221.5	91	389.4
Burlington/Keokuk	93	486.1	105	499.8	167	536.2	35	200.6	17	43.3	58	174.2	31	493.0	276	252.7	90	297.3	61	362.2
Fern Glen	13	29.9	19	271.1	31	301.9			9	122.8	9	53.9	16	53.2	40	46.9	10	61.3	12	161.9
St Genevieve	3	8.8	8	37.2	1	18.4					2	9.6			1	0.2				
Elco																				
Mill Creek											1	8.6								
Kincaid					1	1.0									41	32.9				
Kaolin																	1	1.3	1	0.2
Grover/Lafayette			1	1.6																
BURNT	58	51.4	67	81.8	69	81.3	27	19.4	26	122.8			41	41.5	229	362.5	19	51.0	22	36.0
OTHER	2	3.1	12	11.6	6	10.2	13	27.0			61	1781.3			25	49.5	17	15.1	1	4.4
TOTAL	316	1544.1	614	2237.1	402	1601.6	155	1430.7	132	452.7	350	3712	307	1935.1	975	2332.9	234	4649.1	189	960.7

	FEATURE 61		FEATURE 63		EXC BLK 4		PIECE PLOT 1		PIECE PLOT 2		PIECE PLOT 3		PIECE PLOT 4		PIECE PLOT 5		PIECE PLOT 7		PIECE PLOT 10	
	N	W(g)	N	W(g)	N	W(g)	N	W(g)	N	W(g)	N	W(g)	N	W(g)	N	W(g)	N	W(g)	N	W(g)
CHERT TYPES																				
St Louis	1	0.2																		
Salem	57	1422.2	1	2.4					1	15.6										
Burlington/Keokuk	52	234.1	1	19.0	1	2.7	1	13.7			1	5.9	1	4.8	1	7.2	1	7.0	1	13.7
Fern Glen	8	13.6																		
St. Genevieve																				
Elco																				
Mill Creek																				
Kincaid																				
Kaolin																				
Grover/Lafayette																				
BURNT	21	32.5																		
OTHER	10	22.1																		
TOTAL	149	1724.7	2	21.4	1	2.7	1	13.7	1	15.6	1	5.9	1	4.8	1	7.2	1	7	1	13.7

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